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The Knowledge Level of Preconceptional People about Hazards to Fetal Development and Preconceptional Health Promotion

by ©

Elaine Pedersen

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF NURSING

FACULTY OF NURSING

EDMONTON, ALBERTA
FALL, 1992

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ISBN 0-315-77302-2

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DEGREE FOR WHICH THESIS WAS PRESENTED: MASTER OF NURSING

YEAR DEGREE GRANTED: 1992

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Knowledge Level of Preconceptional People about Hazards to Fetal Development and Preconceptional Health Promotion submitted by ELAINE L. PEDERSEN in partial fulfilment of the requirements for the degree of MASTER OF NURSING

Peggy Anne Field
(Supervisor)

M. Ruth Elliott

J Mager

Date: 11 August 1992

DEDICATION

To my grandmothers . . .

Granny Sweetnam for her sweetness, intelligence and humour . . . and for always supplying an abundance of encouragement and praise for any minor accomplishment.

Grandmother Hole for her great character and leadership providing a strong sense of family honour and morality . . . believing that all should contribute in some way to make the world a better place.

To my parents . . .

Muriel and Harry Hole for their unfailing love, patience, and support . . . and most of all for believing in me . . .

To all the children of the future . . .
yet to be conceived . . .

ABSTRACT

Future parents are often instructed about hazards to fetal health and health promotional practices during pregnancy at their first prenatal visit to their physician or in early prenatal classes. This generally occurs after the major organs of the fetus have developed and is past the time of greatest environmental sensitivity. The female ovum and male sperm of potential parents can also be affected by various environmental and occupational influences before conception. There is a beginning recognition of the importance of shifting the focus of attention from the prenatal period as a time to promote reproductive health to the preconceptional period. The actual practice of preconceptional health promotion is reported infrequently in the literature. There has been little research on the knowledge level of preconceptional individuals about hazards to fetal development and promotion of preconceptional health. The purpose of this study was to look at the knowledge of people attending premarriage courses.

A questionnaire entitled the Preconceptional Knowledge Survey (PKS) was adapted from a previous study on knowledge of early prenatal class participants and was sent to 316 premarriage class participants. One hundred fifty-six completed questionnaires were returned for a response rate of 49.37%. Analysis revealed that although the majority of respondents were high school graduates (96.1%) the mean score obtained on the PKS was 58.14% with a standard deviation of 13.24%. Significant differences in PKS scores were found for educational level and age group of respondent. Analysis of particular topic areas showed a median score of 52.94% on items dealing with nutrition, 72% on hazards to reproductive health, 53.33% on occupational factors in reproductive health, and 53.33% on all preconceptional items. The respondents were determined to have a knowledge deficit especially in the areas of nutrition, occupational hazards and preconception.

PREFACE

If you want to do something or dream you can do it,
begin it . . .
Boldness has genius, power and
magic in it.

Wolfgang Goethe

ACKNOWLEDGEMENTS

Numerous people have contributed to the development and completion of this thesis, and I wish to give my sincere thanks to each and every one of them.

Special thanks are given to Dr. Peggy-Anne Field, my thesis supervisor, for sharing her wisdom and expertise with me, guiding me through the sometimes tedious stages of research with enthusiasm and encouragement, and providing sparks of insight that made a profound impact on the process and outcome of my thoughts.

I would also like to thank the two other members of my thesis committee, Dr. Tom Maguire and Dr. Ruth Elliott who have each made invaluable contributions to this project. Dr. Maguire helped immensely with the analysis and interpretation of the findings of my research. His ability to make statistics come alive and make sense of the real world was an inspiration to me, and his sense of humour always helped put things in perspective. Dr. Elliott was enthusiastic about my research proposal from the beginning and provided valuable input into the formulation of my initial research plans. All committee members proved to be extremely patient and helpful, and contributed their special expertise willingly. Their dedication to quality and the pursuit of excellence has had a profound impact on my thinking throughout this project and I am sure for many years to come.

I also wish to acknowledge the individuals who reviewed and critiqued my research instrument. Sincere thanks to Mrs. Karen Mills, MHSA; Dr. Lynn Skillen and Dr. Keith Still who all provided valuable comments and suggestions.

I would also like to thank statistical consultant Terry Taerum, PhD for providing his invaluable expertise in data analysis, using his ability to make what appeared to be overwhelming obstacles, easily overcome.

Thanks must also be expressed to the four agencies offering premarriage classes who were so willing to support my research and provide me with access to the people who were given the Preconceptional Knowledge Survey. The cooperation of

the Family Enrichment Centre, the Family Service Association, the Pastoral Institute, and the Family Life Education Council was greatly appreciated.

Sincere thanks must be given to all the people who completed the Preconceptional Knowledge Survey. Their participation has allowed the attainment of some invaluable insight into the knowledge of this group of premarriage individuals.

Appreciation is also expressed to the following organizations for the provision of financial support for this project:

Alberta Foundation for Nursing Research
    * Student Research Grant
Alberta Registered Nurses Educational Trust Fund
    * Bursary
Doctor Jean C. Nelson Memorial Foundation
    * Award

Lastly, I wish to express my heartfelt gratitude to my husband Bjarne and to my children Taylor, Lauren and Karin for providing many precious moments in a busy time in our lives.

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CHAPTER 1

INTRODUCTION

Scope and Background of the Problem

Although significant improvements in perinatal mortality rates have occurred in recent decades, reproductive casualties resulting from congenital defects and hereditary disorders continue to be of major concern. Neonatal mortality rates in Canada dropped from 19.3 per 1000 live births in 1958 to 8.3 in 1977 (Lee, 1982). Alberta experienced a decrease in the perinatal mortality rate from 18.6 per 1000 live births in 1972 to 10.59 in 1990 (Alberta Health, 1990). Unfortunately, the congenital malformation rate has not decreased appreciably since the beginning of the 20th century (Cefalo & Moos, 1988). A study by the Centers for Disease Control points to the fact that the incidence of congenital abnormalities may even be increasing (Edmonds, 1986). Cefalo and Moos (1988) hypothesize that the latter might be due to 1) an increased exposure to environmental agents such as drugs and chemicals, 2) medical advancement allowing women with chronic conditions to complete successful pregnancies, and 3) an increased number of women having babies at the beginning or end of their reproductive years.

In each pregnancy there is a 3% risk that a child will be born with some type of serious birth defect

(Genetic Counselling, 1984). What is perhaps of more concern, is that some of these congenital defects could possibly have been prevented. What is known about the prevention of hereditary disorders and birth defects? More importantly, what do people who will some day have babies know about the hazards to fetal development and about what they can do to optimize their chances of having a healthy baby? An assessment of the latter knowledge might be a good starting point in determining what needs exist in the preconceptional population so that professionals can focus their energies in the appropriate direction.

Problem and Purpose

Interest in the topic of preconceptional knowledge about hazards to fetal development and promotion of preconceptional health arose when the writer was teaching prenatal classes. Two of the classes were held in the earlier part of pregnancy, generally between three and five months gestation. A topic that was part of the general curriculum of the prenatal classes was a discussion of hazards to fetal development. Numerous potential parents expressed great concern that they were finding out about hazards to pregnancy after their pregnancies were at least one third of the way completed. They often stressed that they would have liked to have known about the risks before they got pregnant.

The first eight weeks of pregnancy is when the major cell differentiation, and organogenesis of the human embryo occurs. This period of between 17 and 56 days after conception is the time of greatest environmental sensitivity and is when major structural abnormalities can occur (Moos & Cefalo, 1987). Unfortunately, many women do not have their pregnancies confirmed before this critical period of development is completed (Moos & Cefalo, 1987). It is therefore necessary to move into the preconceptional period to be able to influence the first critical weeks of pregnancy. It follows that people before they conceive would need to have knowledge about hazards to fetal development and promotion of preconceptional health in order to be able to ensure optimal conditions in the first part of pregnancy.

It is of great concern to the writer that if people planning pregnancy or already pregnant do not have all the information they need to make informed decisions regarding exposure to hazards to fetal development, that fetus' may be needlessly exposed to preventable hazards. The monetary cost of early detection or treatment of a serious birth defect or hereditary disorder far outweighs the cost of prevention (Hollingsworth, Jones, & Resnik, 1984;

Paton, 1984; Shorney, 1983). The emotional, and psychological costs to both the affected individual and their families are often staggering and difficult if not impossible to measure in concrete terms. The purpose of this study was to determine if preconceptional individuals have the information they need in order to make informed choices.

Research Question

This study was guided by the following research question: What is the knowledge level of people before pregnancy about potential hazards to fetal development and the promotion of preconceptional health?

Preconceptional health promotion is defined as a positively focused activity or process to facilitate and promote the optimal conditions for growth and development of egg, sperm, and fetus of potential parents with a goal of promoting the attainment of the highest potential health of any resulting human being. Health is defined as "the actualization of inherent and acquired human potential through goal-directed behaviour, competent self care, and satisfying relationships with others while adjustments are made as needed to maintain structural integrity and harmony with the environment (Pender, 1987). Potential hazards to fetal development are defined as any internal or external factor affecting either gametes before conception or embryo and fetus after conception in such a way that their structure or function is altered in a detrimental way.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

Literature that referred to the knowledge level of preconceptional individuals about pregnancy, prenatal care and education, preconception and prepregnancy care and education, prevention of hereditary or genetic disorders and congenital abnormalities, and genetic counselling was surveyed from the early 1960's through to the end of 1991. The search was conducted employing both computer and manual searches. Areas in which the search was conducted included medical, nursing, education and social sciences literature. Much of the literature in the subject areas is purely theoretical. Some of the latter reports were omitted due to the redundant nature of the content. All of the available research studies relating to preconceptional knowledge in the area of promoting reproductive health, are included in this review.

This review will proceed in the following manner. A brief overview of the history of the progression of care for the pregnant woman to care and attention to the couple in the preconceptional period will initiate the discussion. Literature addressing the time period before pregnancy will be described. Selected literature will be reviewed in content areas about known and suspected hazards to fetal development.

Literature that has addressed aspects of the knowledge level of prenatal and preconceptional individuals will be reviewed. Gaps in the literature will be identified and trends articulated. Implications and recommendations for research will be discussed.

Historical Perspective

The importance of good prenatal care has been recognized for many years and has in fact made a very significant difference in the outcomes of pregnancy for mothers and babies (Cefalo & Moos, 1988). Studies have shown however, that women first consulted their physicians at an average of six to ten weeks gestation (Paton, 1984), and attended their first prenatal class when they were four months pregnant (Mills, Paddon, Edwards and Kelpin, 1982) indicating that a major portion of the critical cell differentiation and organogenesis of the human embryo has occurred without any prenatal attention. Logic dictates that to ensure that this critical phase of development is included in care, the attention needs to move into the period before conception (Cefalo & Moos, 1988).

Although the concept of preconceptional care began appearing in the literature about 1970, it is primarily based on opinion, speculation, and extrapolation from pregnancy studies (Donoff, 1984; Friesen, 1970; Paton, 1984) with no research documentation to support their statements. I have included some of this writing as providing theoretical background to the importance of preconceptional knowledge.

Preconceptional Focus

Some authors see provision of care in the physician's office during the pre-pregnancy period as a logical extension of prenatal care and especially important since it may be unrealistic to expect women to consult a physician earlier than the present average of six to ten weeks gestation (Donoff, 1984; Friesen, 1970; Paton, 1984).

Some advocate that there is a need for special preconception clinics where all women and their partners be counselled about risks to pregnancy, what they can do to minimize these risks, and promote the greatest chance of a healthy outcome (Chamberlain, 1986; Goldthorp, 1984). Information on smoking, alcohol, and other drugs, rubella, nutrition, exercise, contraception, and spacing of pregnancies, is deemed to be important to provide to people before conception (Bartley, 1983; Rands, 1985).

A coalition representing more than 50 organizations in the United States who are working together for the improvement of maternal and infant health suggests that most of the intervention is presently directed towards reducing risks during pregnancy (Bratic, 1982). They suggest that women should know about risks involved for them before they are pregnant. Preconceptional intervention should be directed toward medical, age, or socioeconomic risk groups such as those with chronic medical conditions, teenagers, those in hazardous occupations or who are exposed to environmental risks, and couples who have a high risk of conceiving a child with an inherited disorder. Bratic says that information should be directed towards the particular target audience "based on the level of knowledge and attitudes toward health and pregnancy, lifestyle, and the kinds of information these women are most eager to obtain" (p. 506), but does not expand on if or how this knowledge level has been assessed.

Emphasis should be placed on the idea of wellness throughout the lifetime of a woman beginning with her birth rather than focusing attention primarily on the prenatal period and labour and delivery (Testmeier & Elsea, 1984).

The Society of Obstetricians and Gynaecologists of Canada (Canadian recommendations, 1983) suggest a referral to a genetic center should take place before pregnancy so that a full discussion of risks and available alternatives can take place. Exposure to teratogenic agents such as medications, chemicals, irradiation, infections and maternal anxiety are included as indications for such counselling. Late maternal age is mentioned as an exception in the list of recommended indications for the preference of pre-pregnancy counselling although others advocate that counselling older mothers before pregnancy is important (Genetic counselling, 1984; Bratic, 1982).

Preconceptional attention to those women with identified health risks such as diabetes or other chronic diseases is also addressed in the literature as being important (Burke, 1985; Dicker, Feldberg, Samuel, Yeshaga, Darp & Goldman, 1988; Reader & Grudzinskas, 1985; Steel, Johnstone, Smith & Duncan, 1982).

Actively planning for pregnancy and reducing risks before pregnancy begins are cited as some of the best ways to prevent low birth weight which is the major factor associated with the death of infants in the first four weeks of life (Brown, 1985 & Institute of Medicine, 1985). No research data is provided to support this claim.

Bartley (1983) points out the lack of research in the effectiveness of preconception care in reducing perinatal mortality and morbidity. Others caution that giving advice to future parents may induce guilt if they cannot or do not comply with recommendations (Reader and Grudzinskas, 1985).

Although all of the aforementioned articles give theoretical support to the concept of promoting preconceptional health, there is no research documentation to support their statements.

Hazards to Fetal Development

Abundant literature exists describing hazards to fetal development. There are many well-documented teratogens but many more questions about the effects of a multitude of occupational and environmental exposures on the developing fetus. Examples in the areas of nutrition, smoking, alcohol, drugs and occupational hazards are included here.

Nutrition

Neural tube defects are thought to be of multifactorial causation, with a combination of predisposing genetic factors and environmental impacts on the fetus resulting in a range of anomalies. The association between maternal nutritional status and the occurrence and recurrence of neural tube defects has been studied by several authors (Laurence, James, Miller, & Campbell, 1980; Smithells, Sheppard & Schorah, 1976). Small sample size, nonprobability sampling, and lack of control of environmental factors limits the useability of the results from the latter studies.

Smithells et al. (1980, 1981a, 1981b, 1983) carried out a multicentre quasi experimental intervention study using periconceptional vitamin supplementation to women who previously had given birth to an infant with a neural tube defect. Control groups consisted of women who refused the supplement or who were already pregnant. The recurrence rates after one baby with a neural tube defect were 0.5% for supplemented women and 4.2% for unsupplemented women with significances of these differences being $p<0.0004$ and $p<0.145$, respectively (Fishers exact test, one-tailed) (Smithells et al., 1983, p. 1030). A randomized controlled study was not possible due to ethical considerations.

The Medical Research Council (1991) recently concluded a randomized double-blind study of 1,817 women in seven different countries who had had a previous baby with a neural tube defect and were at high risk of having another affected baby. The study was done to determine if supplementing the women with vitamins A, D, B1, B2, B6, C, nicotinamide and/or folic acid around the time of conception would make a difference to the recurrence rate of neural tube defects for the women involved. A random allocation of the women to one of four different groups occurred. Group A were given 4 mg folic acid and no other vitamins, group B were given folic acid and the other vitamins, group C were given nothing, and group D were given the vitamins without folic acid. The preconceptional women were instructed to take one capsule a day from the time that they entered into the study until 12 weeks after the first day of the last menstrual period. The study results showed conclusively that folic acid has a role in the occurrence of neural tube defects. There was a 1% recurrence rate of open neural tube defects for the groups who were supplemented with folic acid as compared to a 3.5% recurrence rate for those groups who were not supplemented with folic acid. No significant differences were found when the group given just other vitamins was compared to the folic acid groups or control group. There were no identified adverse effects from the supplementation although due to the number of people in the study, it was limited in ability to detect rare adverse effects. The conclusion was that all women who have had a previous pregnancy with an open neural tube defect should be supplemented before conception with folic acid, and that an effort should be made to ensure that all women who may have children have an adequate intake of folic acid before conception.

Inadequate nutritional status has been implicated in infertility, with concern being expressed about a nutritional status which allows a woman to remain fertile but is not adequate to support the extra needs of supporting a fetus in pregnancy (Worthington-Roberts, 1984).

Some oral contraceptive agents have been found to deplete the body's supply of nutrients such as vitamins B7, B23, C, and folacin in women with generally good nutritional status (Veninga, 1984). Less is known about the effects of oral contraceptive use on the nutritional status of high risk women such as adolescents or the economically disadvantaged.

Smoking

The impact of smoking on pregnancy outcomes has been well documented in the literature. A report of the Surgeon General titled The Health Consequences of Smoking for Women (National Department of Health and Human Services, 1980) lists more than 160 references that discuss the impact of smoking on pregnancy outcomes (p. 239-249). Included are associations between smoking and infertility (Baird & Wilcox, 1985; Howe, Westhoff, Vessey & Yeates, 1985), spontaneous abortion (Lincoln, 1986 & Naeye, 1980), placental irregularities (Asmussen, 1980; Meyer, Jones & Tonascia, 1976), low birth weight (Lincoln, 1986; Meyer et al., 1976), and infant morbidity and mortality (Meyer & Tonascia, 1977).

Alcohol

Smith described the characteristic facial anomalies, physical growth deficiency and central nervous system dysfunction labelled fetal alcohol syndrome (FAS) (1979). A question that remains unanswered is whether there is any safe level of alcohol consumption. Results of one study indicated that mothers with infants who had FAS had a higher level of alcohol intake in the month prior to confirmation of their pregnancy and in the following five months than a control group (Hanson, Streissguth, & Smith, 1978). They concluded that the strongest relationship between fetal outcome and maternal alcohol consumption exists for drinking behaviour occurring in the month before the pregnancy is recognized (Hanson, Streissguth, & Smith, 1978). Much of the research on the effects of alcohol consumption relies on self report which may result in under-reporting. There are also difficulties in controlling for other variables such as effects of paternal alcoholism, use of other drugs, and parity that may have effects on the fetus (Cefalo & Moos, 1988).

Other Drugs

Hill and Stern (1979) note that although the mother is the principal target of drugs administered in pregnancy, "the fetus is essentially an unwanted recipient" (p. 182). Numerous descriptive studies suggest that the majority of women take one or more drugs during pregnancy (Nelson & Farfor, 1971; Doering & Stewart, 1978; Bracken & Holford, 1981). The dangers of maternal drug ingestion was illustrated tragically in the use of thalidomide which had been shown to be safe in animal studies, but resulted in severe anomalies in humans (Hill & Stern, 1979). Although relatively few drugs are proven human teratogens "it is impossible to state categorically that any medication used before or during pregnancy, including topical preparations, is completely safe (Cefalo & Moos, 1988).

Environment and Occupation

The literature is replete with reports of potential and suspected environmental and occupational hazards to reproductive health (Bryant, 1984; Greenberg, 1980; Zenz, 1984). Certain drugs and chemicals used in various occupations have been conclusively demonstrated to affect male reproductive capacity by acting to decrease sperm count and increase the number of abnormal sperm (Dixon, 1985). Included in the latter list are anaesthetic gases, biphenyls, lead solvents (benzene and toluene) and vinyl chloride. Controlled studies on human sperm are possible to do as they can be studied outside the human body.

Other potentially serious environmental exposures are maternal infections that could cause problems for the fetus. The rubella virus is teratogenic in humans affecting the heart, eyes or ears (Centers for Disease Control, 1987). The Centers for Disease Control (CDC) reported that 15-20% of adults are still nonimmune to the rubella virus in the United States (1987). The CDC also reported an outbreak of rubella in New York City with eight cases of congenital rubella syndrome reported between eight to ten months after the peak incidence of rubella in the city (1986).

Genetics

Genetic disorders caused by autosomal dominant, autosomal recessive and X-linked Mendelian inheritance patterns, and congenital anomalies due to chromosomal errors contribute to potential problems for a fetus. Many birth defects, such as the previously discussed neural tube defects, are grouped into a category labelled "multifactorial" which means that causation is attributed to a combination of genetic and environmental factors such as age, diet, social conditions, pollutants and toxins (Farrell, 1988). Only through examination of a detailed family history for the particular family can more insight be obtained into what might be operating in the family, what risks exist for them (Farrell, 1988), and what alternatives are available. If potential parents are unaware of the things that could contribute to damaging their offspring they will be unable to weigh the risks and the benefits of their reproductive decisions to make choices that will help to minimize their chances of a less than desirable outcome.

Knowledge of Prenatal and Preconceptional Individuals

There is little documented research about the knowledge level of prenatal or preconceptional individuals about the hazards to fetal development or preconceptional health promotion. Some surveys of segments of the general population have included one or two questions regarding the impact of a particular factor such as smoking, alcohol, marijuana, or heredity on reproductive health (Abel, 1984; How much, 1989; Little, Harrison, Grathwohl, Streissguth, & McIntyre, 1981; Peters, Rootman, Stephens, & Warren, 1988; Shore, 1985; Still & Mannion, 1983). Moore (1984) found that although women presenting for initial prenatal visits to their physicians felt they had a need for more knowledge about pregnancy, including risks to pregnancy, they were often not offered any advice about pregnancy and one-third of the women who had questions did not ask them. Although the findings from many of these studies showed some deficit in the knowledge of the population they were describing, it is difficult to draw conclusions from the limited data. Sample selection techniques, data collection strategies, and instruments were not well described limiting the usefulness of many of the studies.

Some studies have addressed the importance of the assessment of knowledge level in people attending prenatal classes (Allen & Ries, 1985; Elliot, 1982; Mills, Paddon, Edwards, & Kelpin, 1982). Mills et al. (1982) conducted a descriptive study of 454 'early bird' prenatal class participants' general interests and knowledge about topics pertaining to pregnancy and fetal development. Topics addressed in the questionnaire utilized to assess knowledge were nutrition, medications, alcohol, smoking, x-ray, ultrasound, hyperthermia, immunizations, and bacterial and viral infections. The questionnaire was determined to be a reliable and valid instrument. The mean percent score on the pretest questionnaire was 57%. Sixty-eight percent of respondents agreed that there is no proven safe level of alcohol consumption during pregnancy, 42% agreed that if all women avoid heavy drinking during pregnancy (5 drinks of alcohol per day) the number of mentally retarded babies can be reduced, and 32%, 55% and 22% of respondents thought that drinking alcohol during pregnancy is associated with miscarriage, lower birth weight and a hyperactive child respectively (p. 74). The fact that problems could arise for the unborn baby if the mother smokes was known by 95% of respondents. Sixty-five percent knew that smoking mothers generally have smaller babies, 69% thought that quitting smoking after the fourth month would improve the health of the child at birth, and 35% agreed that infants of smoking parents are more likely to develop respiratory infections than infants of non-smoking parents. In their list of recommendations Mills et al. suggest that "there is a need for information to be provided early in pregnancy, and/or prior to pregnancy, in such settings as high school, premarital classes and the work place" (p. 81). As this study pertains to a specific self-selecting group, the results cannot be generalized beyond this group.

Allen and Ries (1985) conducted a study on smoking, alcohol, and dietary practices during pregnancy which included an assessment of nutrition knowledge. Subjects were a nonprobability sample of 75 women attending one of three prenatal clinics during a three month period, who volunteered to participate. A 14 item multiple-choice questionnaire was administered prior to attendance at a prenatal class and a similar questionnaire completed by telephone contact with the participants four weeks after the class. Correlational analysis revealed a significant positive correlation ($p<.05$) between knowledge and dietary quality on both the pretest and the post test. Less than half of the subjects answered questions about the function and food sources of folacin correctly. No details were provided about the instrument used.

Eiser and Eiser (1985) reported a study in which they interviewed 48 primigravidae between three to four months gestation. Women self selected after being informed of the opportunity to participate in the study at their first antenatal appointment with their family physician. Interviews were then conducted in the women's homes. Knowledge of the fact that the fetus is fully formed by three months of pregnancy was affirmed by 52.6% of the women. The majority of the women (85.4%) knew that the greatest damage to the fetus could occur in the first trimester. When asked about their immunity to rubella, 20.8% did not know whether or not they had had the disease. Only 4.2% of the women were not able to identify the effects of rubella (p.57). No information is provided on the exact structuring of the interviews and who conducted them, to assess if quantitative comparisons are valid. Due to the method of sampling, generalizability to a larger population group is not possible.

Although several preconceptional clinics are in existence little evidence is offered as to the knowledge level of people attending them (Chamberlain, 1986; Dicker, Feldberg, Samuel, Yeshaya, Darp & Goldman, 1988; Goldthorp, 1984). Goldthorp (1984) presents an analysis of 100 preconception patients and compares them to 200 prenatal patients attending the same clinic in the United Kingdom (U.K.). The author observed that preconception services were rarely sought by single, divorced or unemployed groups, making the assumption that the reason for this was due to complacency and that they did not know about the value of preconceptional care. Goldthorp does not indicate how he came to the latter conclusion, does not describe the methodology of his study and does not attempt to validate his assumption about non-participation by some sectors of the population.

Chamberlain (1986) describes a prepregnancy clinic also located in the U.K. that has been in operation since 1978. This clinic operates as a referral center primarily for general practitioners to send couples who are concerned about risks and potential problems for both mothers and babies in future pregnancies. Chamberlain states that it is important that a prepregnancy clinic "untangles the skein of problems with which the couple arrives" but states that an objective assessment before and after attendance at the clinic would be needed to ascertain the value of the clinic.

Dicker, Feldberg, Samuel, Yeshaya, Darp and Goldman (1988) reported the results of comparing the spontaneous abortion rate in a group of diabetic women who had attended a preconception clinic and a group that had not. The frequency of pregnancy losses among the diabetic mothers not seen before pregnancy was significantly higher ($p<0.001$) when compared with the preconceptionally counselled group whose rate of spontaneous abortion was the same as that of the general population. Once again, the baseline knowledge level of these women was not assessed but one must question what both groups knew about the implications of diabetes in relation to pregnancy risks before intervention.

Steel, Johnstone, Smith and Duncan (1982) and Burke (1985) also report on the importance of prepregnancy counselling for those suffering from diabetes because of the increased risk of congenital abnormalities and infant mortality in this population. No mention is made of the present knowledge level of this segment of the preconceptional population about what they can do to prevent problems in pregnancy.

A descriptive survey of 812 women attending family planning clinics in North Carolina showed that preconceptional women averaged 6.6 factors requiring further investigation (Moos & Cefalo, 1987). The most common factors included nutritional inadequacy, use of prescription or nonprescription drugs including oral contraceptives, family history of high blood pressure or diabetes, use of alcohol, smoking, and using lead or chemicals in hobbies. In this survey the knowledge this group of women had about what risk these factors posed to potential pregnancy or what to do about preventing the risk was not addressed.

The Sturgeon Health Unit in St. Albert responded to the expressed need of their prenatal class participants, for more prepregnancy information about hazards and the effects of lifestyle and nutrition on the fetus by conducting a series of two evening preconception classes for adults and a high school preconception class (Gibson, Telford, Ness, Kroetch, and Blair, 1984). A pretest, addressing knowledge of fetal development, nutrition, heredity and lifestyle, was administered to the latter groups as well as to one prenatal class. The preconception group of 23 people received an average score of 74%, while the high school class scored 69% and the prenatal class scored 68%. No information on the development of the tool was given, or of attempts to establish the validity of results. The findings of this study therefore have limited value.

An area in which people are seen routinely for preconceptional concerns is in genetic counselling. Genetic counselling helps families or individuals understand hereditary factors and risks of recurrence of genetic disorders or birth defects that have the potential to affect or have already affected a family member (Genetic Counselling, 1984). Numerous studies have been conducted that have attempted to assess the effectiveness of genetic counselling by evaluating the educational outcome of participants after the counselling has taken place (Carter, 1985; Emery, Watt & Clack, 1973; Hsia, 1974; McCrae, Cull, Burton, & Dodge, 1973; and Reiss & Menashe, 1972). Many of these were retrospective studies so that no assessment of knowledge before counselling took place. It is difficult to know if counselling has been effective without knowing the knowledge of clients when they come for counselling.

Some studies have addressed the prior knowledge level of genetic counselling clients. A prospective study of 200 consecutive clients seen at a genetics clinic was conducted in order to identify the knowledge level of clients about their particular problem, prior to counselling (Emery, Raeburn, Skinner, Holloway, & Lewis, 1979). Each client was interviewed before the counselling session by one of three counsellors. No details are provided as to the structure of the interview or if any attempt was made to standardize the methodology and minimize interviewer bias. Although the majority of the clients (194) were reported to have an "intimate knowledge of the particular genetic disorder" (p. 1254), only 7% knew anything about the genetic mechanism involved and 0% know about the risks to their children. It is not explained what is meant by intimate knowledge. Immediately after genetic counseling, 77% remembered the risks of recurrence of the disorder, three months afterwards, 61% remembered, and two years later only 53% remembered (p. 1254). A higher educational level of the husband was significantly associated with remembering the recurrence risk ($p<.05$). Because of the method used in this study, results cannot be generalized beyond the population studied.

Braitman & Antley (1978) developed a questionnaire to measure knowledge and understanding of Down syndrome before and after genetic counseling. A pre- and post test were developed from the basic instrument using appropriate measures to ensure an objective, reliable, valid (with face, content, and known groups' validity) tool for use in genetic counseling clinics. Details of results of the use of this questionnaire were not reported.

Antley and Seidenfeld (1978) used a structured interview of 13 open-ended questions (which was shown to be internally reliable and consistent based on the expected reliability score ($\alpha=0.80$) and item total correlations) to assess mothers' knowledge about Down Syndrome before genetic counselling. They demonstrated that those with more than a high school education knew about 60% of the genetic information while those with less than a high school education knew only 23% of the genetic information pertaining to the diagnosis. Although an average of about half of the questions were answered correctly, 18% of the mothers answered three or fewer questions correctly and 26% of the mothers answered more than 10 questions correctly. Significant differences ($p<0.005$) were found between those with more than a high school level of education who had the highest mean score for preknowledge, the high school only educated group, and the less than high school educated group who had respectively lower mean scores.

Seidenfeld, Braitman and Antley (1980) utilized the latter sample to attempt to discover the determinants of counselees' pre- knowledge of Down syndrome before coming to counselling. Seven variables were used in a prediction equation to determine the mothers' level of pre-knowledge attainment. A simple recursive path model was developed. Path analysis showed that five variables accounted for 65% of the variance in the mothers' pre-knowledge. The unstandardized path coefficients for these variables were statistically significant. An increased level of preknowledge was associated with a greater time between diagnosis and counseling, a later date of counseling (year and month), an expected level of emotional upset (rather than unusually low levels of upset), increased educational and occupational status, and no use of birth control methods.

Seidenfeld and Antley (1981) went on to describe the comparison of the participants' knowledge before counseling and after counseling, finding that those with less education learned the most from genetic counseling. Results reported by these authors cannot be generalized to the general population because of the non probability sampling utilized and lack of a control group, but do support the need and provide suggestions for further research in the area of knowledge assessment.

Summary

The literature does indicate a trend towards looking at the preconceptional period as being the time to examine all factors that have the potential to interfere with the healthy development of a potential fetus. Research in the area of preconceptional knowledge about hazards to pregnancy and preconceptional health promotion is sparse. No research was found on a general appraisal of the knowledge level of couples who either are planning marriage or are newly married. The latter group might be seen to comprise a large segment of couples who may some day have children.

The literature supports the concept of obtaining a baseline level of knowledge about a population in order to facilitate the planning of appropriate interventions and subsequent meaningful evaluation. An investigation of the knowledge level of preconceptional individuals will allow nurses and other health professionals to assess more effectively the needs of these people, plan effective interventions and ultimately ensure that preconceptional couples have the necessary information and resources to enable the selection of the best alternatives for their particular situation. They will then be able to optimize their chances of having a healthy baby, perhaps preventing needless occurrences of hereditary disorders and birth defects.

CHAPTER III

RESEARCH METHODS

Design of the Study

The study took the form of a descriptive study using a survey with a mailed questionnaire. The study was done to establish a baseline of data about the knowledge level of people before pregnancy regarding hazards to fetal development and preconceptional health promotion.

Sample Characteristics and Sampling Procedure

In Canada, the great majority of people have babies after marriage. In Edmonton in 1989, there were 5,157 marriages (Alberta Health, 1990). About 865 couples (1730 people) per year in Edmonton take premarriage classes. There are four organizations in the city who teach organized premarriage classes, these are the Pastoral Institute (Agency 1), the Family Enrichment Centre (Agency 2), which is associated with the Catholic Church, Family Service Association (Agency 3), and the Family Life Education Council (Agency 4). All organizations offer regular classes from September to June. Yearly registration for Agency 1 is approximately 90 couples attending it's premarriage courses, Agency 2 accommodates about 525 couples, Agency 3 has about 150 couples while Agency 4 registers about 100 couples. The population for this study is couples in Edmonton who take premarriage classes. The study was conducted from March until June 1991. Individuals attending premarriage classes during the period of the study were eligible to participate. Only one class from Agency 2 was included due to the large class size (46 couples). The Preconceptional Knowledge Survey was sent to a total of 316 people (158 couples), and of these 156 surveys were returned to the investigator.

Instrument for Data Collection

A questionnaire that was developed by Mills, Paddon, Edwards, and Kelpin (1982) to assess the knowledge level of registrants in early prenatal classes was adapted for use in the study (see Appendix A). The original questionnaire was developed to assess the knowledge level of people about subject areas pertinent to early pregnancy, more specifically about those factors which could influence the growth and development of the unborn baby (Mills et al, 1982). The questionnaire was validated for content through review by physicians, nutritionists, nursing professors, and nurse specialists (Mills et al., p. 40). Item analysis was performed on the questionnaires and the overall Cronbach's alpha reliability of the pretest score was .81 (p. 40). The index of discrimination and of difficulty was assessed for each item, resulting in an assigned value for each item (p. 40). In addition to obtaining basic demographic data from the respondents, the Mills et al questionnaire includes content relating to nutrition during pregnancy, weight gain during pregnancy, effects of drug use during pregnancy, and also includes items on alcohol, smoking, infection, exercise, and other hazards to pregnancy. The majority of questions from the original questionnaire have been retained in the current version although the wording of certain items has been adapted to account for the fact that the questions will be addressed to a preconceptional population instead of a prenatal population. Some additional items were added to address specific preconceptional concerns. The added items pertain to content areas concerning the influence of heredity on fetal outcome, and the influence of preconceptional occupational and hazardous environmental exposures of parents on ova, spermatozoa and fetus.

The adapted questionnaire, which is referred to as the "Preconceptional Knowledge Survey (PKS)", was submitted for review to Dr. Keith Still who is an obstetrician specializing in care of women with high risk pregnancies, Ms. Lynn Skillen, a nursing professor with background in the influences of occupational hazards in reproductive health, and Mrs. Karen Mills, Director of Nursing with the Edmonton Board of Health who was instrumental in the development of the original questionnaire. The incorporation of changes suggested by the latter experts, along with a review of the current literature pertaining to the questions was done to ensure content validity of the PKS. A pilot study was undertaken to ensure that the PKS would prove to be relevant for the new population.

An assumption made in this study is that a questionnaire is a valid instrument to survey the knowledge of a population and that the participants in the survey would complete the questionnaire with frankness and honesty.

Pilot Test

A pilot test was given to a group of 20 people enroled in premarriage classes to ensure the applicability of the questionnaire in such areas as content, wording, and form of response (Wilson, 1985). This is seen to be valuable due to the new population that the PKS is being utilized for (preconceptional people rather than prenatal people). The individuals taking the pretest were not the same people utilized in the actual study. Some minor wording changes to the PKS were made as a result of the pilot study. It was also deemed important to establish the length of time that it would take individuals to complete the PKS and to determine whether the instructions given were clear (Wilson, 1985).

Study

All couples registering in premarriage classes during the period of the study were informed about it through inclusion of a letter in their registration material (see Appendix B). Registration material is routinely either mailed to the registrant or picked up in person at the particular organization.

Distribution and Collection of Questionnaires

The study was conducted by mailing the PKS to the registrants in the premarriage class. A covering letter was attached to the PKS (see Appendix C) to reiterate the purpose of the study and ask if the couple would participate by completing the questionnaire. A prepared announcement was read by the premarriage class instructor at the first class to direct individuals who would or would not be prepared to participate in the study (depending on the choice of the agency) to write their names and addresses on a form before the end of the class (see Appendix D). Except for Agency 4, the principal investigator was provided with the names and addresses of those that wanted to participate and proceeded to mail the PKS form directly to the subjects. Agency 4 decided that it did not want the investigator to have access to the names of the registrants in their classes so envelopes containing the covering letter and PKS were addressed and mailed by the agency. Different coloured paper was used for each agency, so that the four groups could be compared. The name of subjects was not required on the survey form, but participants were offered the option of providing their name and address so the investigator could provide the participant with a PKS form, correct answers, and a summary of study results. The optional provision of a name of the sample individual was placed on a tear sheet at the end of the PKS. Names were removed from the PKS forms when they were returned and were not associated with answers that were provided. It was assumed that consent was given to participate in the study if an individual returned the completed PKS.

The subjects were asked to return the PKS in an enclosed self addressed, postage paid envelope by a specified date (two and a half weeks after the time of mailing of the PKS). All subjects who were sent PKS forms directly from the investigator were telephoned approximately ten days after the mailing of the questionnaire. Although plans had been made to provide a reminder phone call from Agency 4, they were not able to follow through with recontacting the sample once the PKS had been sent. The purpose of the second contact was to determine if the individual had received the

PKS, and to remind them of the date that it was requested back. The contents of the PKS were not discussed during this phone call.

Methods of Data Analysis

Data from the completed PKS forms was entered into the computer. The SPSSx program (Norusis, 1988) was used to analyze the research data.

Reliability testing of the PKS using Cronbach's alpha coefficient was performed.

The distribution of demographic variables such as sex, age, education, religion, birth control method, children, if first marriage, and when (or if) the individual is planning a baby were assessed for their distribution in the total sample and across the four groups of premarital individuals attending classes at each of the four organizations. Crosstabulations of agency by each demographic variable were performed to ascertain if there were any differences between agencies. Chi square tests of independence were utilized to look at the differences between observed and expected frequencies in the latter tables to determine if there were any relationships. Post hoc analysis using Scheffe tests were used after significant chi square tests to determine the location of significant relationships.

Correct responses to the items on the PKS were assembled into a frequency distribution and stem and leaf displays and box and whisker plots were constructed to facilitate a visual portrayal of the data. Individual items were grouped into categories according to the four major topic areas of nutrition, hazards to reproductive health, occupational factors in reproductive health and questions dealing with preconception, for the identification of clusters of knowledge, or lack thereof. The data was then analyzed to determine if relationships existed between test performance and any background variables such as prior education, sex or age. T-tests were utilized to compare the means of two groups (example: males and females) and the one-way analysis of variance (ANOVA) was used to determine if there were any significant differences between the means of three or more groups (example: four levels of education). Following a significant one-way ANOVA a Tukey test was utilized to pinpoint which of the pairs of means were actually significantly different.

The probability of type-I error in the reporting of statistics in this study was set at $\alpha = .05$ which is the most commonly chosen value of alpha (Glass & Hopkins, 1984). This means that the probability of being correct when discussing significant differences is 95% and that there is a 5% chance of being incorrect or concluding that there is a significant difference in a particular comparison when there is not. In other words there is a 5% chance of making a Type I error and rejecting the null hypothesis of no differences or independence when in fact the alternative hypothesis is true. Actual probability values are reported.

Summary

In Chapter III the methods utilized in the research were described. This narrative included the design of the study, the research instrument used, the data collection from the premarriage class participants and the methods of data analysis. In Chapter IV the findings from the research will be presented and interpreted.

CHAPTER IV

FINDINGS

The findings from the study will be reported in two sections: (a) the response rate to the Preconceptional Knowledge Survey and (b) the results of the Preconceptional Knowledge Survey.

The Response Rate to the PKS

Preconceptional Knowledge Survey's were sent to 316 potential participants (158 couples). One hundred fifty six people (49.37%) returned their completed PKS to the investigator. Female respondents numbered 92 (58.23%) of the latter returns, while male respondents comprised the remaining 64 (40.51%) returns. A portrayal of returns from the four individual agencies is shown in Table 4.1.

The lower response rate from Agency 4 may have occurred as a result of some problems that occurred with the distribution of the PKS. The latter agency had decided not to allow the investigator access to the names of the individuals who had consented to participate in the study, and were to mail the PKS out directly from the agency. An error occurred and the PKS was initially mailed out only to the females. The error was discovered by the investigator a few days later when the questionnaires were then mailed to the males. The agency then decided they did not have time to make the follow up phone calls to the participants, so the individuals from agency 4 were not given any reminders or opportunity to ask questions about completion of the PKS.

Table 4.1

Response Rate to the PKS

AGENCY	SENT	RETURNS					
		MALE		FEMALE		TOTAL	
		#	%	#	%	#	%
1	108	24	44.44	35	64.81	59	55.00
2	92	21	45.65	28	60.87	49	53.26
3	44	10	45.46	11	50.00	21	47.73
4	72	9	25.00	18	50.00	27	37.50
TOTAL	*316	64	40.51	92	58.23	156	49.37

* equal numbers of males and females (ie PKS sent to both male and female members of 158 couples).

The Results of the PKS

The results of the PKS will be discussed in terms of the demographic characteristics of the respondents, total scores obtained on the PKS, and scores obtained on items grouped into particular topic areas. When the study was initiated, it had been planned to undertake a detailed comparison between the four agencies involved in the study. However, the data revealed that religious affiliation was the only significant difference between the agencies making comparison between agencies relatively meaningless. It was therefore decided to omit any detailed comparison between agencies, and look at religions of the respondents within the entire sample. Religion was expected to be significantly different because one of the agencies was affiliated with the Roman Catholic church and another was connected with the Protestant churches.

Demographic Characteristics of Respondents

Sex

The distribution of male and female respondents to the PKS are shown in Table 4.2. Although the PKS was given to an equal number of males and females, there were 18 percent more female respondents than males. A greater response from females could have been anticipated due to the fact that pregnancy directly involves a women's body therefore motivating female involvement in a study dealing with reproductive issues. A significant difference was found in the distribution of male and female respondents among the various age groups (χ^2=5.1579, df=1, p=0.023). Further analysis was performed to determine what contributed to the significant chi square value. Post hoc analysis using Scheffe contrasts (Marascuilo & McSweeney, 1977) was performed to test for contrasts in sex distribution between the 15-24 and 25-29 year old age groups, the

15-24 and the 30+ age groups and the 25-29 and 30+ age groups. The null hypothesis of no contrast was rejected for the contrast between the 15-24 and 30+ groups but was not rejected for the other contrasts. This demonstrates that the significant chi square value is due to differences in the distribution of males and females in the youngest and oldest of the three age groupings. Looking at the raw data (Table 4.4) it is apparent that there are a greater proportion of females in the younger age group and a greater proportion of males in the 30+ age group. Chi square analysis revealed that males and females were not different in their distribution throughout the various educational levels, religious denominations, whether or not they had children, when and if they were planning pregnancies, type of birth control method being used, or present sexual activity.

Table 4.2

Sex of Respondents to PKS

SEX	FREQUENCY	PERCENT
Female	92	59.0
Male	64	41.0
Total	156	100.0

Age

As is illustrated in Table 4.3, the majority of respondents to the PKS (84%) were between the ages of

20-29 years with 97.4% being under 35 years of age. Only 1.3% of respondents were 19 years of age or younger and 2.5% were 35 years old or older. The Vital Statistics Annual Review (Alberta Health, 1990) reports that for first marriages in Alberta in 1989, 76.9% were between 20-29 years with 94.7% being under 35 years. Only 2.27% were 19 years or younger, and 5.28% were 35 years or older. The proportions of the various age groups are distributed in roughly similar proportions as in the province of Alberta. Chi square analysis confirmed that the null hypothesis of no differences in proportions of age groups among the categories of education, religion, whether or not they had children, type of birth control being used, or present sexual activity could not be rejected. There is therefore no significant difference in the proportions of the three age groups among the latter variables.

Table 4.3

Age of Respondents to PKS

AGE	FREQUENCY	PERCENT
15-19	2	1.3
20-24	61	39.1
25-29	70	44.9
30-34	19	12.2
35+	4	2.5
Total	156	100.0

Table 4.4

Sex and Age of Respondents to PKS

SEX	AGE			
	15-24 YEARS	25-29 YEARS	30+ YEARS	TOTAL
FEMALE	44 (28.2%)	40 (25.6%)	8 (5.1%)	92 (59.0%)
MALE	19 (12.2%)	30 (19.2%)	15 (9.6%)	64 (41.0%)
TOTAL	63 (40.4%)	70 (44.9%)	23 (14.7%)	156 (100.0%)

(%) Percentage of total n=156

Education

None of the respondents had less than at least some high school education. Approximately a fifth of respondents did not proceed past high school with their formal education. Table 4.5 shows that the majority (96.2%) of all respondents had completed high school, while many of them (46.1%) had gone on to take some college, technical school or university training. University graduates comprised 33.3% of the respondents.

Table 4.5

Education of Respondents to PKS

EDUCATION	FREQUENCY	PERCENT
Grade 9 or less	0	0
Some high school	6	3.8
High school grad	26	16.7
Some college	19	12.2
College graduate	35	22.4
Some university	18	11.5
University grad	46	29.5
University post grad	6	3.8
TOTAL	156	100.0

Religion

As is displayed in Table 4.6, the major religious affiliations reported were Protestants and Catholics. This was to be expected as two of the premarriage groups were affiliated with the protestant and Catholic churches respectively. No religious beliefs were said to be held by 9% of the sample.

Table 4.6

Religion of Respondents to PKS

RELIGION	FREQUENCY	PERCENT
Protestant	82	52.6
Catholic	50	32.1
Other	9	5.8
No Religion	14	9.0
No Response	1	0.6
TOTAL	156	100.0

Marriage

A large majority (96.2%) of the sample group were being married for the first time, while only six of the 156 people (3.8%) had either been married before or lived in a previous stable relationship. Of the total marriages occurring in Alberta in 1989, 63.9% were first marriages (Alberta Health, 1990) so proportionately fewer people getting married for the second or more time were represented in the respondents from the premarriage classes.

Children

The majority of respondents 141 (90.4%) reported that they did not have children although 3 (1.9%) of the latter group had had a previous miscarriage. Twelve (7.7%) respondents had one or more children of their own and 3 (1.9%) stated that their partners had one or more children (Table 4.7). None of the respondents reported being pregnant.

Table 4.7

Children of Respondents to PKS

Children	Frequency	Percent
None	138	88.5
None/ Previous miscarriage	3	1.9
Pregnant	0	0
1 or > child	12	7.7
Partner has 1 or > child	3	1.9
TOTAL	156	100.0

Therefore, a total of 15 (9.6%) of the respondents had had some personal experience with conception. Women represented 67% of those with their own children.

A majority (95.4%) of the respondents reported that they planned to have children at some time in the future. Plans for trying to conceive a baby within the next two years were reported by 23% of respondents, another 40% had plans to try within 25 months to 3 years, and another 32.2% had no definite time plans but definitely would like children. A decision not to have children had been made by 4.6% of people.

Sexual Activity

Ninety one percent (140) of the 154 people who answered the question reported being sexually active at the time of the PKS (Table 4.8). Six (4.3%) of the sexually active people said they were not using any birth control.

Table 4.8

Sexual Activity of PKS Respondents

Sexual Activity	Frequency	Percent
Yes	140	89.74
No	14	8.98
No Response	2	1.28
TOTAL	156	100.00

Fourteen (9%) of the respondents to the question reported no sexual activity. The latter is the only method of birth control, short of sterilization that entertains no risk of conceiving a child. Eight of the fourteen people were using birth control, perhaps due to their imminent marriages, or possibly as a precaution just in case sexual activity occurred. Eight of the fourteen non-sexually active people had been sexually active in the past with six of the latter respondents using some form of birth control. The individuals who had been sexually active in the past but were not at present were more likely to be using birth control than those that had never been sexually active in the past. Four of the six individuals not using birth control had never been sexually active.

Birth Control

The most popular method of birth control being used at the time of the PKS was reported to be the birth control pill with 100 (92.46%) of the 140 sexually active respondents specifying the latter method. On the other extreme, no one reported using the intrauterine device as a method of birth control.

The condom was used by (44) 31.88% of the sexually active people. Twenty-five (56.82%) of the condom users combined the method with another type of birth control, with the condom and birth control pill being the most popular combination with 17 people combining the condom and the pill. In addition to the birth control pill and condom, three of the latter people also used spermicide. These three respondents were the only ones who combined three methods of birth control. Five other people used spermicide and condoms together. Temperature or cervical mucous monitoring was used in addition to the condom by 2 respondents and 1 person reported using the diaphragm or cervical cap also in addition to the condom. The condom without any other method was used by 19 (43.18%) of the condom users. No birth control was being practised by 6 (4.3%) of the sexually active respondents. Only 2 people did not provide a response to the birth control question on the PKS.

Total Scores on the PKS

It was possible to obtain a total score of 59 on the Preconceptional Knowledge Survey. The frequency or number of respondents obtaining each particular score is portrayed visually in the Stem and Leaf display in Table 4.9. In this table the stem represents units of ten and the leaf represents individual observations. For example, a stem of one and a leaf of two would be read as a score of 12 in Table 4.9.

The distribution of the scores displays a pattern that is unimodal and roughly symmetric. The mean score of the 156 respondents was 34.33 (58.14%) with a standard deviation of 7.81. The range of the scores was from 12 (20.3%) to 54 (91.5%). A median of 34 (57.6%) was calculated for the PKS with the most popular score (mode) being 29 (49.2%). Approximately 25% of people had scores of 29 (49.2%) or less and roughly 25% of respondents had scores of 40 (67.8%) or more.

The center, spread, and overall range of the distribution of the scores of the respondents is displayed visually in a box and whisker plot in Table 4.10. The Cronbach's alpha reliability of the scores of all the items on the PKS was .8221 which is considered to be a good reliability score (Cronbach,1951) demonstrating that the questions in the PKS have good internal consistency.

Table 4.9

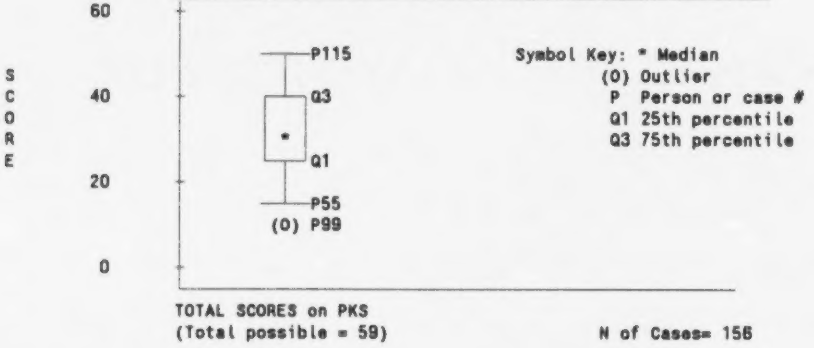
Stem & Leaf Display of Scores on PKS

Frequency	Stem(tens)	&	Leaf(ones)
1	1	*	2
4	1	.	7889
10	2	*	0122233444
31	2	.	5555577777777778999999999999999
35	3	*	00000000111111111222333333333344444
31	3	.	5555666666666666777777888899999
27	4	*	000000001111112222334444444
15	4	.	555555677788999
2	5	*	04

- Stem width: 10 - Each Leaf: 1 case(s)

Table 4.10

Box and Whisker Plot of Distribution of Total Scores on PKS



In examining the previous data it is apparent that the respondents to the PKS were not able to answer many of the questions relating to preconceptional health promotion and hazards to fetal development. The fact that one quarter of the people knew less than half of the correct answers to the questions on the PKS, and that three quarters of the people were not able to correctly answer over 30% of the questions on the PKS is of concern. In order to gain more understanding of the results the total scores were looked at in relationship to the various demographic characteristics of the respondents.

Total Scores and Sex

Using a t-test it was determined that there was no significant difference in the means of the total scores for males and females in the PKS (Table 4.11). In other words the score obtained on the PKS was not influenced by sex of the respondent.

Table 4.11

T-test of Difference in Total Scores for Sex

SEX	# of Cases	Mean	Standard Deviation	Difference	t Value	Degrees of Freedom	P
Male	92	35.04	7.464	1.74	1.38	154	0.170
Female	64	33.30	8.242				

Total Scores and Age

The age categories were collapsed into three distinct groups; the 15-24 year olds, the 25-29 year olds and the respondents who reported being 30 or more years of age. A one-way analysis of variance was performed to compare the variation among the means of the total scores of the three age groups. As is seen in Table 4.12, they were not equal but were significantly different. A box and whisker plot demonstrates visually the difference in total scores for the three age groups of respondents (Table 4.13). The age group that a respondent belonged to made a difference in performance on the PKS as measured by the total score.

Table 4.12

One-way Analysis of Variance of Total Score for Three Age Groups

Source	Degrees of Freedom	Mean Squares	F Ratio	F Probability
Between Groups	2	261.5525	4.4756	.0129
Within Groups	153	58.4394		

The Tukey method of multiple comparisons was used to compare the difference between each pair of age group means in order to determine which pairs were significantly different (Table 4.14). The scores of the 15-24 year olds were significantly different than the 25-29 year old respondents. On average the 25-29 year old age group scored higher (mean=60.36%) than the younger age group (mean=54.45%). The mean of the total scores of the 30+ age group was slightly higher (mean= 61.75%) than the 25-29 year old age group but was not significantly different.

Table 4.13

Box and Whisker Plot for Distribution of Total Scores for Three Age Groups

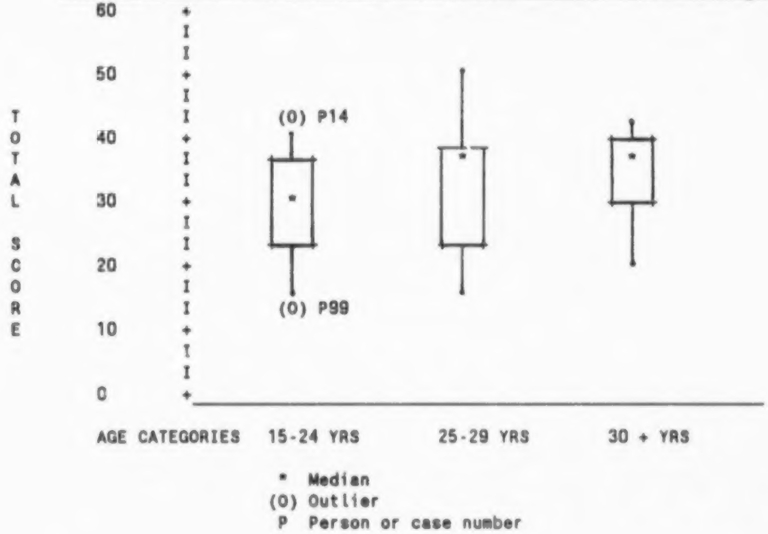


Table 4.14

Results of Tukey Test for Three Age Groups

Mean	Group	n		Grp 1	Grp 2	Grp 3
32.1270	15-24 yrs	63	Grp 1			
35.6143	25-29 yrs	70	Grp 2	*		
36.4348	30 + yrs	23	Grp 3			

* Denotes pairs of groups significantly different at the .05 level.

Total Scores and Education

The education categories were collapsed into four categories for analysis of total scores. Those individuals who had some high school education were put into the first category (n=32), people who had taken some college, technical school or university were put into the second category (n=37), those who had finished college or technical school were placed into the third category (n=35) and university graduates (n=52) comprised the fourth category. Analysis of variance to compare the variation among the means of the total scores for the four educational groups demonstrated that they were not equal but were significantly different (Table 4.15). Educational level made a difference in test performance on the PKS. A box and whisker plot demonstrates the difference in total scores for the four education groups (Table 4.16).

The Tukey Test was used to compare the pairs of means of the total scores of the four education groups. As is shown in Table 4.17, the only groups which proved to have significant differences were the high school educated group and the university educated group of respondents. On average the university educated people scored higher (mean=62.32%) than those who had acquired only high school education (mean=51.70%).

It is interesting to note that although there were significant differences in the total scores of age groups and educational groups, the chi square analysis alluded to previously demonstrated that the educational levels and age of the respondents were independent of each other.

Table 4.15

One-way Analysis of Variance for Four Education Groups

Source	Degrees of Freedom	Mean Squares	F Ratio	F Probability
Between Groups	3	260.1239	4.5531	.0044
Within Groups	152	57.1313		

Table 4.16

Box and Whisker Plot for
Distribution of Total Scores for Four Education Groups

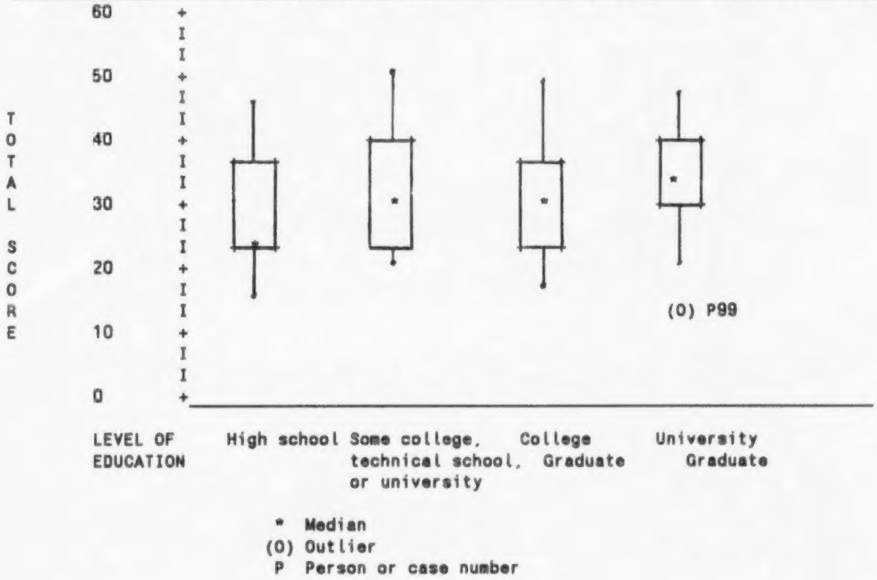


Table 4.17

Results of Tukey Test for Four Education Groups

n	Mean	Group		Grp 1	Grp 2	Grp 3	Grp 4
32	30.50	High school	Grp 1				
37	34.14	Some college	Grp 2				
35	34.40	College grad	Grp 3				
52	36.77	University grad	Grp 4	*			

(*) Denotes pairs of groups significantly different at the .05 level.

Total Scores and Religion

Comparisons of the means of the total scores of respondents who reported being Protestant, Catholic, some other religion or who had no religious beliefs were compared using the one-way analysis of variance. As seen in Table 4.18 there was no significant difference found between the means of the four divisions of religion.

Table 4.18

One-way Analysis of Variance of Means of Total Scores for Religious Groups

Source	Degrees of Freedom	Mean Squares	F Ratio	F Probability
Between Groups	3	77.3453	1.2666	.2880
Within Groups	151	61.0672		

Total Scores and Marriage

As was previously mentioned the vast majority of the people responding to the PKS were entering their first marriage. The disparity in numbers of first marriages (150) compared to those who had either been married before or had lived in a previous stable relationship (6) was too great to make any valid comparisons.

Total Scores and Children

There was no significant difference in the scores of those who did not have children and had never been pregnant compared to those that had had a miscarriage, or who had one or more children (no respondents were pregnant). In other words, there was no difference in test performance for people with some personal experience surrounding the event of conception compared to those with no experience conceiving a pregnancy.

Table 4.19

t-test of Difference in Means of Total Scores for Children

CHILDREN	# of Cases	Mean	Standard Deviation	Difference	t Value	Degrees of Freedom	P
1.None	138	34.21	7.74	1.32	-0.62	151	0.535
2.Miscarriage or 1 or > child	15	35.53	8.65				

Total Scores and Sexual Activity

A t-test was utilized to compare the mean of the total scores of the respondents who were presently sexually active with the people who reported no sexual activity at the present time. No significant difference was found between the latter two groups (t=1.28, df=152, p=.204). The overall knowledge level of the people who were 'at some risk' of conceiving a child presently was not significantly different than the people who were not participating in behaviour that could lead to conception.

Total Scores and Birth Control

The means of the total scores of people using various types of birth control at the present time were compared using the one-way analysis of variance. The types of birth control consisted of those using a condom, condom and spermicide, diaphragm or cervical cap, birth control pill, intrauterine device, other methods (including a combination of the aforementioned methods) or no method of birth control. There proved to be no significant differences in total scores associated with the method of birth control used (Table 4.20). The type of birth control used by respondents did not make a difference in test performance.

Table 4.20

One-way Analysis of Variance of Means of Total Scores for Method of Birth Control Used Now

Source	Degrees of Freedom	Mean Squares	F Ratio	F Probability
Between Groups	4	12.7405	.2115	.9317
Within Groups	148	60.2352		

In order to make analysis more meaningful, the questions on the PKS have been divided into subcategories to reflect respondents knowledge level on particular subject areas.

Scores on Items in Particular Subject Areas

The questions on the PKS were divided into four major subject areas. The first group of questions pertained to nutrition, the second group had to do with hazards to reproductive health, the third included questions dealing with occupational factors in reproductive health and the fourth group of questions were related to preconception. A number of topic areas within each major group of questions are also alluded to. It must be remembered that small numbers of questions asked on specific topics affect reliability and therefore conclusions must be tentative.

Scores on Grouped Nutrition Items

There were 17 items pertaining to nutrition on the Preconceptional Knowledge Survey. The frequency or number of respondents obtaining each particular score is portrayed visually in the Stem and Leaf display in Table 4.21. Both the median and mean score that respondents attained on nutrition items were 9 (52.9%). The standard deviation was 2.78. The range of the scores was from 3 (17.7%) to 16 (94.01%) with the mode being a score of 8 (47.06%). Approximately 25% of people had scores of 7 (41.18%) or less and about 25% of people had scores of 11 (64.71%) or more.

Table 4.21

Stem & Leaf Display of Scores on Grouped Nutrition Items in PKS

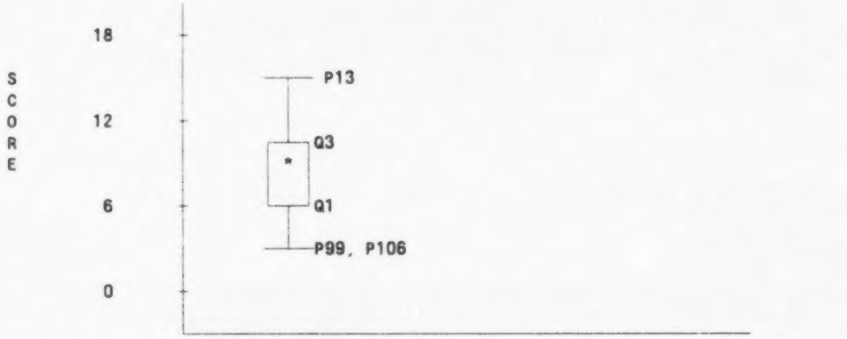
```
Frequency      Stem &  Leaf

    2           0 *  33
   14           0 .  44444445555555
   30           0 .  666666666666677777777777777777
   45           0 .  888888888888888888888888888899999999999999999
   32           1 *  00000000000000000001111111111111
   24           1 .  222222222222223333333333
    8           1 .  44444455
    1           1 .  6

Stem width:      10.00
Each leaf:        1 case(s)
N = 156
```

Table 4.22

Box and Whisker Plot of Scores on Grouped Nutrition Items in PKS



CORES ON GROUPED NUTRITION ITEMS ON PKS Total possible score=17
N of cases = 156

Symbol Key:

*	Median
Q1	First quartile
Q3	Third quartile
P	Person or case number

The box and whisker plot in Table 4.22 illustrates the distribution of nutrition scores.

Included in the nutrition items in the PKS were items that referred to nutrition and pregnancy, nutrition and preconception, food groups in general and food groups for the prenatal period. Some of the items were overlapping in that they could refer to more than one of the previously mentioned divisions of nutrition. Table 4.23 provides a breakdown of analysis for all the nutrition items as a group. The analysis of the smaller groups of items referring to the particular areas of nutrition is provided for descriptive purposes.

Table 4.23

Measures of Central Tendency and Variability of Grouped Nutrition Items

	Total Possible Score (100%)	Mean		Median		Standard Deviation	Range	
		#	%	#	%		Min	Max
All Nutrition Items	17	9	52.94	9	52.94	2.78	3	16
Nutrition & Pregnancy	9	4.55	50.56	5	55.56	1.77	1	8
Nutrition & Preconception	7	3.56	50.86	3	42.86	1.50	0	7
Food Groups General	4	1.76	44.0	2	50.0	1.05	0	4
Food Groups Prenatal	4	1.92	48.0	2	50.0	1.34	0	4

Half of the respondents were able to correctly answer just over half of the nutrition items correctly although it is apparent that on average the food group items posed the greatest difficulty. Although a significant difference between the average total scores of the younger and middle age group was previously alluded to, it is interesting to note that there proved to be no significant difference in mean scores of the three age groups when only the nutrition items were looked at and a oneway ANOVA performed (df=2, 153, F=2.3993, p=.0942). Similarly, there were no significant differences in the mean nutrition scores of the four education groups (df= 3, 152, F=1.6259, p=.1857) although there had been in the total scores. There were no significant differences for mean nutrition scores for any of the other demographic variables.

Although answers to individual questions may have limited value in the determination of knowledge about a subject, it is of interest to note how respondents answered some of the items on the PKS. One seemingly common misconception that 75% of people had was that it is good practise to limit use of salt during a normal pregnancy. The majority (94%) of people did not believe that the unborn baby would obtain needed nutrients no matter what the pregnant woman ate or drank. This indicates that respondents do know that maternal intake can affect the nutritional status of the fetus. Only 46% affirmed that a woman who does not gain enough weight during pregnancy has an increased chance of having a premature or low birth weight baby. In the questions about the Canada Food Guide, 45% of respondents underestimated the servings of fruit and vegetables needed, 55% underestimated the servings of breads and cereals needed, and 30% were too low in their estimates of required servings of meats and alternatives. The required servings of milk and milk products were overestimated by 62% of respondents. Only 4-5% of people said that they did not know what the recommended servings of the various food groups were. The percentage of respondents underestimating the required intake of the various food groups in pregnancy were 20% for fruit and vegetables, 27% for breads and cereals, 16% for meats and alternatives, and only 2% for milk and milk products. However the percentage of people stating that they did not know the answers for recommended servings in pregnancy jumped to between 19-20%.

The Canada Food Guide is the guide that illustrates what the different food groups are in which the recommended minimum servings from each food group in order to obtain an adequate nutrient intake are discussed (Canada, 1983). The Canada Food Guide is taught in Edmonton schools in health and home economics classes. Since all of the respondents completing the

PKS had some high school education, it can be assumed that if they were educated in Canada, they would have been exposed to the Canada Food Guide at some point in their educational career. They may not have been exposed to information specifically related to preconception or prenatal nutrition, as the former has not been widely recognized as important, and the latter is not addressed as a rule until well into pregnancy. It is therefore even more alarming that half of the respondents only knew 50% or less of the available information about food groups. If the respondents were not able to correctly answer basic questions on nutrition it could be assumed that they did not have the knowledge about nutrition that was needed to choose correct answers. Possessing a lack of knowledge about nutrition would make it difficult if not impossible to make food choices that would ensure the attainment of basic nutritional requirements for healthy bodies.

Scores on Grouped Hazard Items

The second group of items that was looked at in the PKS were those questions dealing with hazards to reproductive health. There were 25 items dealing with hazards and reproductive health. The mean score was 17.69 (70.74%) with a standard deviation of 3.67. The median score was 18 (72.0%) and the mode was 17 (68%). The range was from a score of 6 (24.0%) to a perfect score of 25 (100%). One quarter of the people obtained a score of about 15 (60%) or less and 25% of the people scored about 20 (80%) or higher. The frequency of respondents obtaining the various scores is portrayed in the stem and leaf display in Table 4.24. A visualization of the distribution of the scores may be seen in the Box and Whisker Plot in Table 4.25.

Table 4.24

Stem and Leaf Display of Scores on
Grouped Items about Hazards to Reproductive Health

```
Frequency    Stem &  Leaf

    2     0  . (6), (7)  (extreme scores)
    2     0  .  8
   25     1  *  01223344444
   70     1  .  5555555666777777777888888899999999
   55     2  *  000000000011111111222223334
    2     2  .  5

Stem width:     10
Each leaf:       2 case(s)
```

The items about hazards to reproductive health included items pertaining to alcohol, medication, immunization, infection, smoking, and x-ray. For descriptive purposes only, measures of central tendency and variability have been provided in Table 4.26. Some items are not exclusive to any one of these smaller categories, and where appropriate have been included in more than one subject area.

Table 4.25

Box and Whisker Plot of Scores on Grouped Items about Hazards to Reproductive Health

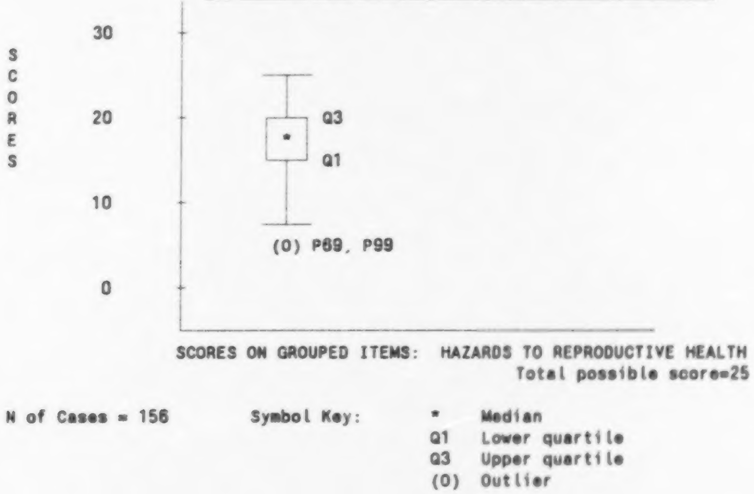


Table 4.26

Measures of Central Tendency and Variability of Grouped Items on Hazards to Reproductive Health

	Total Possible Score (100%)	Mean #	Mean %	Median #	Median %	Standard Deviation	Range Min	Range Max
All Hazard Items	25	17.69	70.74	18	72.00	3.66	6	25
Alcohol	6	3.98	66.33	4	66.67	1.30	1	6
Medication & Immunization	8	5.55	69.31	6	75.00	1.50	2	8
Infection	5	4.23	84.60	4	80.00	0.90	1	5
Smoking	4	2.96	74.00	3	75.00	0.94	1	4
X-ray	4	2.71	67.75	3	75.00	1.18	0	4

The performance of respondents on the hazard items was on average much stronger than both their overall scores on the PKS and on the nutrition subcategory. In looking at the breakdown of topics that the hazard items pertained to, it is apparent that several of the topics such as alcohol and smoking have been major targets of public educational campaigns.

Various anti-smoking groups have been very vocal over the past few years and have successfully lobbied for a City of Edmonton bylaw preventing smoking in the workplace and requiring restaurants to have designated no smoking areas. Compulsory warning labels on cigarette packages contain various messages about the specific risks of smoking. Included in these are warnings that smoking while pregnant could harm an unborn child. All of these initiatives have likely increased exposure of the respondents to information about the effects of smoking. Respondents demonstrated their knowledge about smoking with 99% correctly rejecting the notion that when the pregnant woman smokes only her lungs are involved so there is little or no problem for her unborn baby. Over 40% of respondents however could not affirm that infants of parents who smoke are more likely to develop pneumonia and bronchitis in their first year of life than children of parents who do not smoke.

A major focus of the Alberta Alcohol and Drug Abuse Commission (AADAC) has been to provide education about the risks of using and abusing alcohol and other drugs. Their work has included providing information about the risks of drugs and alcohol in pregnancy. The Alberta Family Life and Substance Abuse Foundation has recently been commissioned to complement the work of AADAC in conducting research and educational projects to pursue, as one of its goals, the reduction of alcohol and substance abuse in families (Alberta Health, 1991). Major media campaigns have been launched in the past few years against drinking and driving with encouragement of the appointment of a designated driver in a situation where there will be alcohol consumption and the checkstop program to find and punish those driving with a blood alcohol level that is over the legal limit. These campaigns most certainly have increased the public awareness about alcohol, hopefully also helping to promote increased attention to the special case of alcohol in relationship to pregnancy. When asked if there is more alcohol in 1 ounce of hard liquor than in either a bottle (12 oz) of beer or a glass (4 ounces) of wine about 20% of people gave the incorrect affirmative answer, and 15% were not sure. Eighty six percent of respondents knew that Fetal Alcohol Syndrome caused effects that could not be reversed by discontinuation of drinking in the last month of pregnancy, by special medical attention after birth or through environmental stimulation. Ten percent of people did not know the answer to the latter question, but six (4%) respondents thought that reversal was possible. The fact that anyone believes that the effects of drinking at least 5 drinks of alcohol per day could produce problems that could be reversed is alarming. It would be interesting to compare the attitudes about alcohol and drinking habits of the respondents with their answers to the question. When asked which conditions were associated with drinking alcohol during pregnancy 62% agreed that miscarriage could be connected, 75% knew that lower than normal birth weight could be related, but only 42% realized that hyperactivity of an infant could be associated with drinking in pregnancy. The fact that there is no proven safe level of alcohol consumption during pregnancy was not known by over 28% of the respondents. It would be interesting to know what amount of alcohol the latter respondents thought would be safe to drink for a pregnant woman.

X-rays have become a very commonplace diagnostic tool and there are few people who have not had at least one x-ray in their lifetime. A part of standard precautions prior to taking x-rays is to ask women if they are pregnant, a practice which in itself conveys the message that pregnancy might be a contraindication to x-ray. Risks from radiation are well documented and have received renewed media coverage with events such as Chernobyl and the effects of large doses of radiation on babies exposed prenatally. It was somewhat surprising that 50 (32%) respondents did not believe that it would be important to know if a woman could be pregnant when going to emergency because of a broken wrist. Perhaps these respondents did not associate the probable necessity of having an x-ray for assessing the damage to a broken bone. One hundred ten (71%) respondents thought that x-ray technicians could be risking preconceptional damage to their egg or sperm, although 15 (10%) did not, and 29 (19%) were not sure. Comments from respondents who believed preconceptional damage could occur included "excessive radiation can affect sperm or egg production (cell production)", "lower sperm viability, stopping of testicular function damage egg cells", "sterility", "induction of chromosomal aberrations non disjunction, chromosome breakage", "rough handling". Those who did not believe damage could occur preconceptionally gave comments such as "there is no possible way it could effect", "because there is really nothing to harm if this was true you should never have x-rays", "x-ray technicians are usually protected by a panel", "not exposed to large amount of x-rays. Well protected". The percentage of people thinking that x-ray technicians could be risking damage to their developing baby in pregnancy jumped to 82.4% (126 people) with only 3.2% (5) that did not think there would be risk, and 14.4% (22) not sure. Comments from those who thought there would be risk to the developing baby included "always asked by attendant if pregnant", "no radiation is good for unborn children", "radiation can cause cell damage and abnormal cell growth in the baby", "the bad rays", "exposure to chemicals", "x-rays penetrate right thru the mom's body to the baby", "mutation of fetus cellular development", "that is why there is ultra-sound". Many of the comments demonstrated a general awareness that radiation is harmful.

Pharmacists have played a role in educating people about medication. Caution codes and labelling on drugs, including warnings against taking the medication when pregnant, increases exposure of the general public to the notion that pregnancy is a special case. Although the answer to one question cannot be used to provide a general assessment of knowledge in one area it is interesting to note that only 43% (67) of people thought that it was a pregnant woman's responsibility to discuss the benefits and risks of taking a medication prescribed for her during pregnancy by her doctor. This perhaps reflects the historical tendency to rely on the medical person with unquestioning faith that they will do the right thing. Encouraging people to take more responsibility for their own health by asking questions and participating in decisions regarding their own health care is critical in health promotion.

Since many of the topics addressed in the group of items pertaining to hazards to reproductive health have been the subject of some public educational or media focus, and the mean scores in the latter section were markedly higher than the overall mean scores, is it possible that education has had an impact on the knowledge level of people about these areas?

As was determined by a oneway ANOVA, the only demographic characteristic that resulted in a significant difference in mean hazard scores, was education (df=3, 152, F=3.7960, p=.0116). The Tukey test portrayed significantly greater mean scores on the hazard items for the university educated respondents (mean=74.85%) compared to those with high school education (mean=64.25%).

Scores on Grouped Occupational Items

The third group of items dealt with occupational factors in reproductive health. Out of a total possible score of 15, the mean score that the respondents achieved in this category was 7.69

(51.27%), with a standard deviation of 3.47. The median score was 8 (53.33%). The scores covered the entire range of possibilities from 0 to 15 (100%). About 25% of respondents obtained a score of 4 (26.67%) or less and about 25% of respondents obtained a score of 10 (66.67%) or more. The stem and leaf display in Table 4.27 shows the frequencies of each score for the group of occupational items. Table 4.28 provides a visual display of the distribution of the scores on the grouped occupational items.

Table 4.27

Stem and Leaf Display of Scores of Grouped Items about Occupational Factors in Reproductive Health

```
Frequency    Stem &  Leaf

    8          0 .  00111111
   14          0 .  22222233333333
   22          0 .  4444444455555555555555
   26          0 .  66666666777777777777777777
   38          0 .  88888888888888888999999999999999999999
   29          1 *  00000000000111111111111111111
   13          1 .  2222222223333
    6          1 .  445555

Stem width:     10
Each leaf:       1 case(s)    N of cases = 156  Missing cases = 0
```

Items in the group pertaining to occupational factors in reproductive health dealt with occupation and preconception, occupation and pregnancy and chemicals. Measures of central tendency and variability for these particular areas are provided for descriptive information in Table 4.29. Once again, some of the items pertained to more than one of the smaller subject areas and have been therefore included in all of the appropriate groups for analysis.

Table 4.28

Box and Whisker Plot of Scores on Grouped Items about Occupational Factors in Reproductive Health

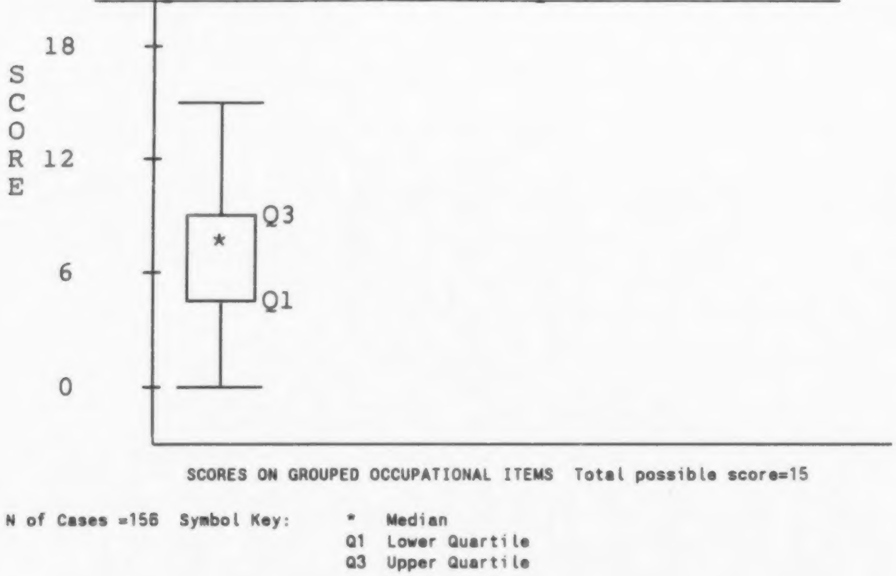


Table 4.29

Measures of Central Tendency and Variability of Grouped Items about Occupational Factors in Reproductive Health

	Total Possible Score (100%)	Mean		Median		Standard Deviation	Range	
		#	%	#	%		Min	Max
All Occupational Items	15	7.69	51.27	8	53.33	3.47	0	15
Occupation & Preconception	8	3.93	49.13	4	50.00	2.0	0	8
Occupation & Pregnancy	7	3.76	53.71	4	57.14	1.85	0	7
Chemicals	7	4.05	57.86	4	57.14	2.08	0	7

Just over half of the items pertaining to occupational factors in reproductive health were answered correctly by half of the respondents. Or put in a different light, half of the respondents could not answer just under half of the items about the influence of occupational factors in reproductive health.

If scores on the PKS could be construed to provide some representation of the knowledge the respondents have, about half of the people would be greatly lacking in the knowledge they would need in order to be able to make informed assessments and choices about occupational environments that have been shown to pose potential risks prior to and during pregnancy.

Provision for comments from respondents about their answers to the occupational items elicited some additional information about their knowledge of particular occupations.

Pottery Makers Most of the respondents who said that pottery makers might be at risk of damaging their egg or sperm before conception, said that it was because of "lead content in the glazes" but one respondent commented that "sperm may be damaged if sitting all the time".

Those who did not believe that 'potters' were at risk preconceptionally made comments such as "no toxic chemicals or fumes", "I would think that this occupation shouldn't be too hazardous (I doubt you can alter physically)", "low stress, low physical", "no chemicals or extreme heat or heavy lifting".

Most people who thought pottery makers were at risk for harm to the developing baby in pregnancy made comments such as "because of the lead content in glazes", "due to the aerosols and fumes produced" but other comments were that "pottery making can be labor intensive that could harm the baby", "if pottery is heavy", "posture", "in sitting position all day", and "use of stomach muscles".

Comments from those stating that pottery makers did not risk damage to their developing baby in pregnancy included "not very physical and low stress", "you're not using really harmful chemicals".

Farmers Fifty percent of respondents believed that farmers were at risk of damaging their sperm or egg prior to conception. Awareness of the potential risks to egg or sperm that farmers are exposed to preconceptionally was demonstrated by comments such as "working with chemicals and pesticides", "exposure to insecticides and herbicides can be hazardous" ". . dust", "stress . .", "hard work", and "genes are too tight".

Those who thought there was no preconceptional risk to farmers said "you're not using harmful chemicals", "rare they touch harmful ingredients", and "my Dad is a farmer and all of us kids are fine".

Sixty one percent of respondents thought that farmers would be risking damage to their developing baby in pregnancy. Comments regarding potential risks to the developing baby in pregnancy also included concern about toxic exposure to pesticides, insecticides, herbicides, fertilizers and chemicals in general but also included numerous comments about the long hours, unusually heavy physical labour, lifting, stretching, and high rate of accidents associated with a farming occupation.

Painters Fifty six percent of respondents thought that painters risked preconceptional damage to their egg or sperm. Most cited inhalation of paint, paint thinner, solvent and cleaner fumes as the reason for their answer with a description of the "toxic smell" given by one respondent. One person suggested that "paint toxins would depend on if water soluble paints were used or not" and another said that "toulene has been known to cause organ damage. Why not to egg or sperm?" One respondent suggested that painters are "exposed to metals and chemicals that can cause infertility in men and impair implantation of embryo in women". One person qualified their 'not sure' answer by saying that potential risk "depends on ventilation conditions".

Comments of those who answered that painters had no potential risk to egg or sperm included that "it does not effect it because the air breathed does not effect egg or sperm" and "I don't think paint fumes reach these areas (egg or sperm)".

A much higher percentage (77%) thought that painters risked damaging their developing baby. Reasons given for affirming potential damage to the developing baby in pregnancy mainly alluded to the concern with fumes from products associated with painting. A thought as to how the fumes would impact upon the fetus was reflected in the comment one person gave by saying that "fumes can create a hypoxic situation". A couple of people alluded to the risk of the heavy labour involved in painting, and one cited posture as being a potential factor in causing harm to the developing baby. Although most did not specify what type of damage they thought paint could cause, one respondent specified that "some paints can damage a fetus. Decreased birth weight, birth defects". Only two of the respondents mentioned lead as being a harmful component in the paint.

Operating Room Staff Operating room staff were thought to be potentially risking damage to their egg or sperm before conception by 27% of respondents. Reasons given included "x-rays harm from radiation", "exposure to germs and infections from patients", "exposed to anaesthetic gases", and "high stress, heavy lifting". Those who did not think there was any harm for operating room staff preconceptionally said that they work in a "well protected environment" that is "sterile" and that "except for long hours should present no danger".

Thirty seven percent of people said that operating room staff could be risking damage to their developing baby in pregnancy suggesting that they are "open to viruses and disease", "chemicals and drugs present" and the "stress involved".

Others thinking that there is no risk to the developing babies of operating room staff said that they "think of [the operating room] as a clean place" and that there would be no risk "if sterile technique is employed".

House Cleaners Only 35% of respondents thought that house cleaners could be risking damage to their egg or sperm before conception. Comments from the latter individuals mainly alluded to potential toxic effects of household cleaning agents.

Those who thought their was no preconceptional risk for house cleaners included "as long as industrial strength chemicals are not used", "plenty of harmless cleaning products on the market", "household cleaners shouldn't be too harmful unless ingested", and "not if used properly (adequate ventilation, etc.)".

Again there were a higher number of respondents who thought there may be risks to the developing baby in pregnancy (60%). Many cited toxic cleaning products as the reasons for their answers, but physical exertion with heavy lifting, moving, stretching, and assuming awkward positions were seen to contribute to the risks to the developing baby with miscarriage alluded to as a possible outcome by one respondent.

Once again after a significant oneway analysis of variance the Tukey procedure confirmed that the university educated respondents demonstrated significantly greater mean scores on the occupational items (mean=56.4%) than those with highschool education (mean=39.79%) (df= 3, 152, F=3.7708, p=.0120). The same analysis of religious groups showed that on average those with a Catholic faith scored significantly higher on the occupational items (mean=55.2%) than those with no religious beliefs (mean=35.24%) (df=3, 151, F=2.8126, p=.0413).

Scores on Grouped Preconception Items

The fourth and last category included items in the PKS that pertained to preconception. There were 22 items in the latter group. The mean score of the respondents was 10.72 (48.72%) with a standard deviation of 3.52. The median was 11 (50%), and the most popular score (mode) was also 11. About one quarter of the respondents obtained a score of 8 (36%) or lower and about one quarter of the respondents achieved a score of 13 (59%) or higher. The range of the scores went from 3 (13.6%) to 20 (90.9%). Table 4.30 is a stem and leaf display of the frequencies of scores obtained on the grouped preconception items. The box and whisker plot in Table 4.31 provides a visual portrayal of the distribution of the scores.

Table 4.30

Stem and Leaf Display of Scores on Grouped Preconception Items

```
Frequency    Stem  &  Leaf

 6           0  *  44&
54           0  .  566667777777788888888999999
74           1  *  0000000111111111122222333333344444444
21           1  .  5555667778&
 1           2  *  &

     Stem width:   10
     Each leaf:     2 cases
            & :     denotes fractional leaves (1 case)
     N cases = 156.0   Missing cases = 0
```

The items that were grouped into the preconceptional category covered a wide array of questions pertaining to the preconceptional period. Some items specifically referred to aspects of genetics and heredity, another with occupational aspects of preconception (see page 69) and another subcategory within the preconceptional group dealt with preconceptional nutrition (see page 61). The measures of central tendency and variability for these items have been compiled in Table 4.32.

Table 4.31

Box and Whisker Plot of Scores on Grouped Preconception Items

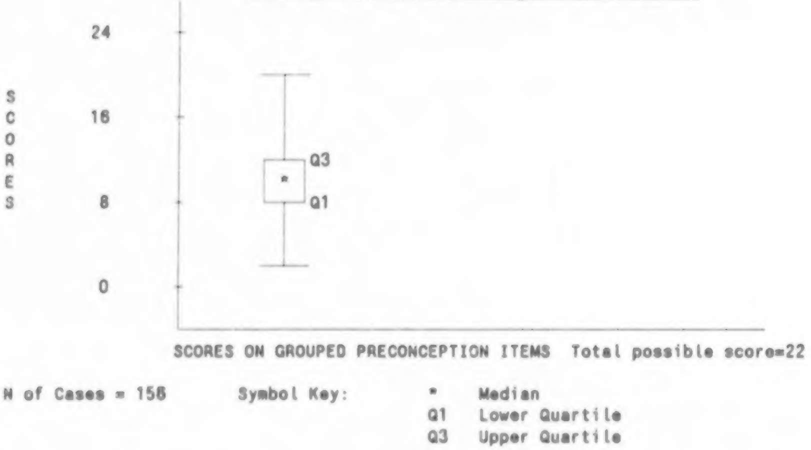


Table 4.32

Measures of Central Tendency and Variability of Grouped Preconception Items

	Total Possible Score (100%)	Mean		Median		Standard Deviation	Range	
		#	%	#	%		Min	Max
All Preconception Items	22	10.72	48.7	11	50.00	3.52	3	20
Occupation & Preconception	8	3.93	49.13	4	50.00	2.0	0	8
Nutrition & Preconception	7	3.56	50.86	3	42.86	1.5	0	7
Genetics & Heredity	4	1.55	38.62	2	50.00	0.85	0	3

It is apparent that the respondents on average had difficulty answering the preconception items correctly. Only half of the items were answered correctly by just over half of the respondents. Conversely, about half of the people were not able to answer 50% of the items dealing with preconception. An example of a specific item in the PKS deals with discontinuation of the birth control pill prior to attempted conception. While 14.1% of people would discontinue use of the birth control pill and try to conceive immediately, 16.7% would use another birth control method for at least three weeks. Only 57.7% would wait the recommended 3 to 6 months after stopping the pill, prior to attempting conception.

As was seen in the review of the literature, the recognition of the preconceptional period as being important is only just starting to be recognized even in the medical community. It could therefore be expected that the respondents to the PKS would not have had much if any exposure to the concept of attention to the preconceptional period in preparation for the promotion of optimal health during their potential future reproductive period. Assuming that scores on the PKS are predictive of knowledge about preconception, it is of concern that so many potential parents have such a lack of knowledge about what is important before conception to promote the development of a healthy baby.

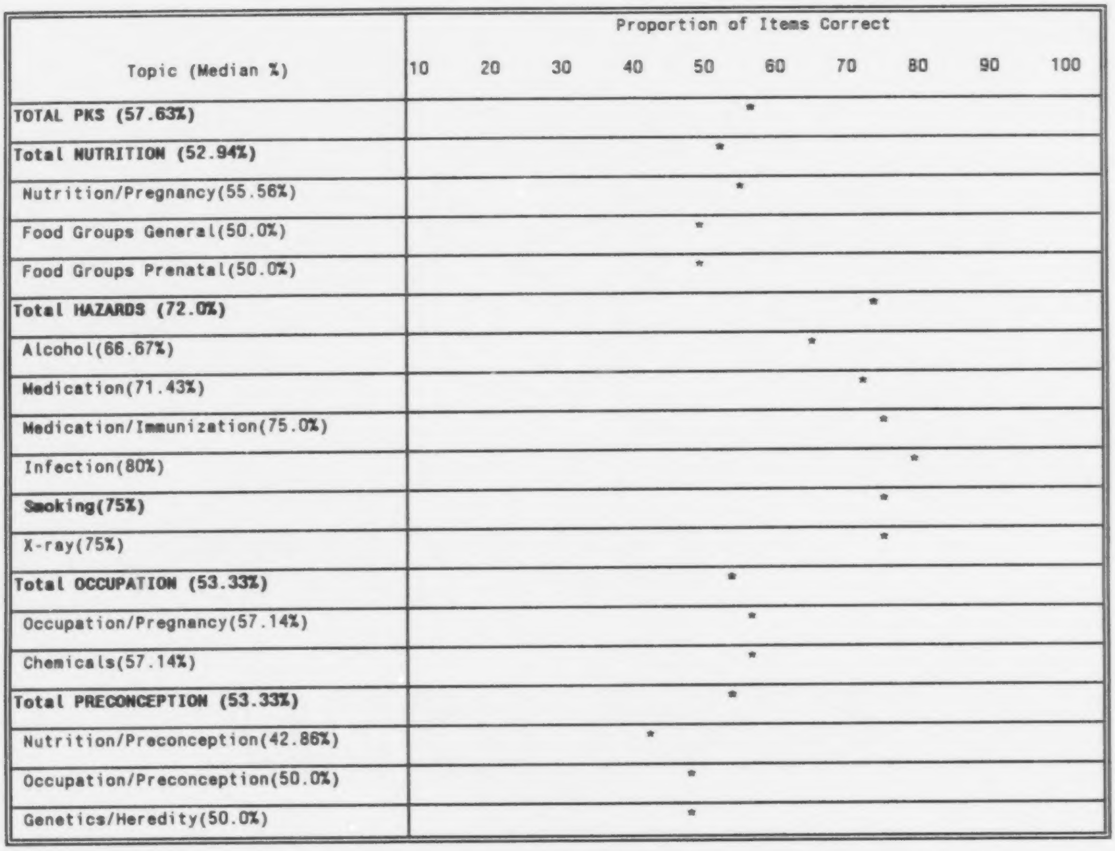
Performance of a one-way ANOVA revealed that education was the only demographic characteristic in which there proved to be significant differences for mean scores on the preconception items (df=3, 152, F=7.1222, p=.0002). The Tukey test revealed that the college graduates (mean=49.9%) had mean scores that were significantly higher than the high school group (mean=39.63%). University graduates (mean=54.98%) scored significantly higher than both the high school educated group and the college graduates in average preconception scores.

Summary

In attempt to summarize the results of the scores on particular topic areas, the median scores (or the 50th percentile scores) of the total PKS and particular topic areas have been compiled into a comparative graph in Table 4.33. At least one half of the respondents to the PKS achieved scores equal to or less than those scores that are shown in Table 4.33. As illustrated by these scores, many respondents to the PKS have a knowledge deficit especially in the areas of nutrition, occupational hazards and preconception.

Table 4.33

Median Scores for Specific Topic Areas



CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The focus of this study was to undertake an assessment of what people who may some day have babies know about the hazards to fetal development and about what they can do to optimize chances of having healthy offspring. A research instrument utilized in a previous prenatal study was adapted for use in a preconceptional population.

The Preconceptional Knowledge Survey (PKS) was distributed to people attending premarriage classes in the City of Edmonton. A response rate of 49.37% was achieved. This research only addressed knowledge level of the participants and did not attempt to study attitudes, behaviours or potential interrelationships between knowledge, attitudes and behaviour.

Conclusions

Most (96.2%) of the respondents were between the ages of 20 to 34. Eighteen percent more females than males replied to the PKS. There were a significantly greater proportion of females between 15-24 years of age and a significantly greater proportion of males age 30 or more.

The educational level was fairly high as all of the respondents had some high school education with 96.1% being high school graduates. Completion of a post secondary education with graduation from college, technical school or university was reported by 55.7% of the respondents to the PKS.

A Protestant or Catholic religious affiliation was reported by 84.7% of people with no significant differences found between the two major religious groups.

A majority of the respondents (96.2%) were anticipating their first marriage, 92.3% did not have any children, and 95.4% said that they planned to have children at some time in the future.

Present sexual activity was reported by 91% of people and the majority (95.71%) of sexually active people were using some type of birth control.

The scores on the PKS demonstrated that many of the respondents had difficulty answering the questions on the knowledge survey. The mean score was 58.14% (34.33 out of 59) and half of the 156 respondents were not able to answer over 42% of the questions.

Age group analysis showed that the under 24 year old age group had an average score of just over half of the questions correct, significantly different than the older age groups who scored about 60%. This would indicate that the younger age group might be even more in need of some intervention.

Although significant differences in scores were discovered between the lowest (high school) and highest (university educated) educational groups, the mean scores gradually increased with level of education attained. On average, the group of respondents with only high school education answered just over half of the questions correctly. Lower educational status might be another indicator of knowledge deficit as indicated by PKS scores. It is interesting to note however that person number 99 appeared as an outlier, or had an extreme low score in the distribution of total scores, nutrition items and hazard items (see Tables 4.10, 4.21 and 4.26). The latter male also reported having the highest level of education (university educated) and was between 20-24 years old. Mills et al (1982) found in their study of early bird prenatal class participants that more education was associated with higher scores. The PKS was adapted from the questionnaire used in the Mills et al study.

It could be hypothesized that if people are involved in an activity that could potentially result in the conception of a baby that they might be more likely to take some interest in the subject and might be more knowledgeable. This was not found in the results of the PKS, as those who reported being sexually active did not show any difference in knowledge than those who were not presently having sex.

A better portrayal of the particular strengths and weakness of the respondents was obtained by looking at the results of answers to groups of items divided into topic areas.

Nutrition was an area in which many respondents had a great deal of difficulty. Half of the people answered less than half of the nutrition items correctly.

A similar result was found in the Mills et al study where an average score of 46% was obtained on nutrition items (p. 69). The descriptive survey of preconceptional women in North Carolina mentioned nutritional inadequacy as one of the most common factors requiring further investigation (Moos & Cefalo, 1987).

The nutrition scores in the PKS were not related to age or education implying that all age groups and educational levels might be deficient in knowledge in the area of nutrition. As is suggested in Canada's National Guidelines for Nutrition in Pregnancy (Health and Welfare Canada, 1987) nutrition is a basic environmental variable influencing the course of pregnancy and subsequent birth of a baby. Inadequate nutrition can threaten the health of the poorly nourished person and in pregnancy could lead ultimately to the birth of a low birth weight baby with greater risks of morbidity and mortality (Institute of Medicine, 1985). If basic nutritional information is lacking, the respondents might have great difficulty being able to make informed decisions about food choices leading to a diet including all essential nutrients. Unless this group of preconceptional respondents have some type of intervention between now and when they conceive their children, they would have a gap in knowledge of how to obtain proper nutrients.

It would be interesting to assess actual nutritional intake of the respondents to the PKS to see if their actual dietary intake had a relationship to their knowledge about nutrition. Is it possible to eat well and have adequate nutrition without knowing what you are doing? What minimum level of knowledge would people need in order to make correct food choices? A study in which knowledge about nutrition was assessed in conjunction with behaviour in making food choices, preferably over time, would be necessary in order to answer the latter question.

The second group of items analyzed were those dealing with hazards to reproductive health. The scores in this category were markedly higher than the overall or nutrition scores. Half of the PKS respondents were able to answer over 70% of the questions dealing with hazards.

The Mills et al study (1987) also demonstrated that the prenatal people in their survey had a higher level of knowledge about hazards to pregnancy than of their total score or score on nutrition items. As was alluded to earlier in this paper perhaps since many of the items in the hazard category have been topics in the popular press, people have had the opportunity to learn about them. For example, the teratogenic effects of drinking too much alcohol during pregnancy have been recognized for a long time and the fetal alcohol syndrome has been well publicized in medical and lay journals since the early 1970's (Jones & Smith, 1973; Ulleland, 1972). Smoking has had perhaps even more exposure with the allocation of non smoking areas in restaurants, airplanes, and the workplace directly impacting the everyday lives of people. Rationale for these changes in smoking policy have received wide press coverage, with the risks to unborn babies of smokers receiving attention as well. However, respondents knowledge on some of the questions was found to be deficient. For example, over 40% of people did not know that infants of parents who smoke are more likely to develop pneumonia and bronchitis in their first year of life than children of parents who do not smoke.

It would be interesting to correlate an

individual’s use of alcohol, cigarettes, or other specific hazards to reproductive health with their knowledge about the hazard. No attempt was made in this study to determine the particular behaviours of respondents such as drinking alcohol or smoking. Alcohol and smoking were also cited by Moos and Cefalo as being among the most common factors requiring further investigation in their study of preconceptional women (1987). Although the knowledge level of the preconceptional women in their study was not assessed, one would wonder if the need for further investigation of alcohol or smoking behaviours was in any way associated with knowledge about smoking or alcohol.

The third group of items was about occupational factors in reproductive health. Half of the respondents did not know almost half of the answers to these questions. In Keleher’s article summarizing writings on the effects of various occupational environments on reproductive health and outcomes, sterility, impaired sexual functioning, miscarriage, chronic disease, offspring with either physical defects, behavioral or developmental disabilities or who are at increased risk for childhood cancer are all cited as potential results of hazards encountered in the workplace (1991).

Unfortunately, hazards in the workplace are not always readily apparent and the detrimental effects may not be realized or well researched and documented for years after they are initially suspected (Keleher, 1991). It is therefore even more important that workers are aware enough to assess their own or their partner's workplace for potential and proven preconceptional hazards. They must possess enough knowledge to be able to ask questions prior to conception in order to ascertain where any potential risks may exist and to be able to take action to reduce or eliminate these risks. They would need to know that the workplace is a place where hazards to reproductive health can present for both a man or a woman, and also that these hazards can be causing damage to egg or sperm long before the decision to conceive a child is reached.

Would respondents who were only able to answer an average of about half of the occupational items correctly, many of which alluded to proven occupational hazards, be aware of the potential perhaps elusive hazards that a workplace may contain? Would their knowledge of health promoting behaviours such as good nutritional intake allow them to make choices to confront often unknown environmental exposures with optimal health perhaps decreasing their susceptibility to environmental assault?

The final category of items that was analyzed in the PKS contained items dealing specifically with the preconception period. On average the respondents were able to answer fewer than half of the items correctly, with half of the people scoring 50% or less.

Perhaps the poor scores on preconception items were due to the fact that the concept of paying attention to the preconceptional period as being important for a healthy pregnancy has only just begun to receive attention in the medical community (Jack & Culpepper, 1990). There are some articles and books about preconception directed to the lay population (Sussman & Blake Levitt, 1989) but there are as yet few practitioners who actually provide comprehensive preconceptional care. It is therefore very likely that few of the respondents would have been exposed at all to the importance of paying attention to the period before conception to promote the health of a future baby. Any potential influences on the egg and sperm before conception have been largely unrecognized or ignored, with a sudden rush for information and education occurring after pregnancy is well established and more often than not, organogenesis complete. The Surgeon General in the United States has set a national goal of increasing the proportion of family physicians who provide routine age appropriate preconceptional counselling to their patients by the turn of the century (Public Health Service, 1990). It is encouraging that in the literature, the focus of promoting health during pregnancy seems to be shifting towards the preconceptional period. However, beginning discourse in the medical community historically begins long before any discernible change in practice. Barron, Ganong, and Brown (1987) examined preconception teaching by nurse practitioners and determined that it was not adequate when compared to a model for preconceptional counselling that they had developed. They concluded that "obstetrical care has not expanded into preconception counselling" p. 605. It raises concern that the people in this study could only answer half of the questions about preconceptional factors in reproductive health. The results portray a deficit in knowledge that the respondents would need to have in order to enter pregnancy in an optimal state thereby maximizing chances of producing healthy offspring. For instance, lack of awareness of the importance of collecting and sharing a family history with a physician before conception (45% of respondents) could prevent the discovery and exploration of health or genetic factors that might be important to consider before making a decision to conceive a baby.

The importance of control of medical conditions such as diabetes and maternal PKU prior to pregnancy to improve the chances of healthy offspring are well documented (Kitzmiller, Gavin, Gin, Jovanovic-Peterson, Main & Zigrang, 1991; Drogari, Smith, Beasley & Lloyd, 1987; Waisbren, Doherty, Bailey et al, 1988). In order to achieve this control individuals with particular medical conditions must first of all be diagnosed, and secondly be made aware of the importance of attention and treatment prior to conception. This would include detection of infections such as STD's many of which could be treated prior to conception thereby preventing potential damage to a fetus. This study made no attempt to determine what the health status or family histories of respondents were, but it would be of interest to determine if there was any relationship between knowledge level about preconceptional factors and people who had family history of birth defects, genetic disease or some medical condition such as diabetes or an STD.

Referral for genetic counselling before pregnancy is ideal in that a couple have time to assimilate the information about their particular situation and risks, consider their options, and undertake any preventative measures that may be appropriate (Chamberlain & Lumley, 1986). Discussion of prenatal diagnosis can occur without the pressures and emotions of pregnancy.

Options can then include not to choose to conceive a child if risks are unacceptable. Almost fourty percent of respondents to the PKS did not know that preconceptional genetic screening of potential parents is possible to detect carriers of genes that cause conditions such as cystic fibrosis (Strom, Verlinsky, Nilayeva, Evsikov, Cieslak, Lifchez, Valle, Moise, Ginsberg, & Applebaum, 1990).

Preconceptional genetic diagnosis in women who are heterozygous for a particular gene is now possible (Verlinsdy, Ginsberg, Lifchez, Velle, Noise, & Strom, 1990). This has been done by genetic analysis of the polar body of oocytes retrieved from the mother and ascertainment of those containing the maternal unaffected gene. Only those oocytes containing the unaffected gene would be used for fertilization. Without knowledge that attention to the preconception period is important to the attainment of optimal health for potential offspring, it is unlikely that preconceptional people will seek attention prior to attempting conception and may place unnecessary, preventable risks on their offspring.

Of concern is the fact that the respondents in this study had a relatively high educational level with the majority having high school education. Higher educational levels resulted in higher scores. If the knowledge level of this group of well educated individuals is not good, what would the knowledge level of people with even less education be? What does a lack of knowledge mean with regards to health practices?

In summary, it appears that on average the group of preconceptional individuals in this study demonstrated a significant lack of knowledge, and would not have the information they would need in order to make informed choices about promoting preconceptional health.

Implications for Nursing Practice

At present, there is little information on the knowledge level of preconceptional individuals about hazards to fetal development and promotion of preconceptional health. An establishment of the baseline knowledge of people attending premarriage courses provides this data on a segment of the preconceptional population.

The results of the PKS provide factual data for nurses to use in lobbying funding agencies for more health care dollars to be spent on interventions in the preconception period, rather than waiting until after pregnancy is underway, perhaps too late for prevention of damage to a developing fetus. Although dollar savings in prevention and health promotion are difficult to measure, one California program involving intensive preconceptional diabetes management found that participants in the program accumulated 30% less hospital charges. They concluded that after adjusting for inflation and differences in charges across hospitals, $5.19 was saved in hospital charges for every dollar spent on the program (Scheffler, R.M., Feuchtbaum, L.B., & Phibbs, C.S., 1992).

The Expert Panel on the Content of Prenatal Care (Public Health Service, 1989) has recommended that preconception care should be included as an important part of prenatal care for all women and their partners. Jack and Culpepper (1991) have suggested that the development of the concept of preconceptional counselling be a priority for the 1990's. Nurses have the opportunity to be at the forefront of this important shift towards health promotion of the earliest moments of life. Nurses are involved with people of all ages and developmental levels. With their various and unique opportunities to develop relationships with their clients nurses can utilize assessment and teaching skills to increase the awareness of the importance of preconceptional attention in many different settings and initiating, and implementing health promotional measures with a preconceptional focus for any potentially reproductive client. Potential interventions could include preconceptional classes or counselling sessions by public health nurses for those individuals who are planning pregnancies.

Distribution of a tool such as the 'preconceptional health appraisal' (Moos, Cefalo, 1987) (a self-administered questionnaire that is meant to both provide an assessment of risks, and to teach women about the effects of lifestyle choices and risks to pregnancy) might be utilized in centres such as public health centres, schools, doctors offices or family planning clinics.

A segment on preconceptional health promotion might be added to the premarriage course content. A pamphlet could be developed dealing with preconceptional health promotion and potential hazards to pregnancy. This could be distributed in health education classes including high schools and premarriage classes, physicians offices, public health centres, genetics clinics, hospitals, and public libraries to name only a few.

Information could be presented on television and radio to increase the awareness of preconceptional health issues. A video and summary literature could be developed and distributed to health professionals to educate them about the importance of attention to the preconceptional period.

Occupational health nurses could provide pertinent information to clients about potential hazards in their particular workplace and discuss ways to promote optimal preconceptional health. The possibilities for nursing involvement are limited only by the imagination. Nurses could stimulate the involvement of stakeholders from many different sectors comprising both professional and lay community individuals and groups in this area of health promotion. This would help ensure a healthy environment and the adoption of lifestyles more conducive to the attainment of optimal health throughout the lifespan and thus for future generations.

Limitations of the Study

The investigator had no control over the conditions present when participants filled out the questionnaire and must assume that questions were completed accurately. Environmental conditions such as the television, phone, interruptions from other people or pets, or such factors as stress at home or work, fatigue, or illness could influence the way in which the questionnaire was answered. There was also no control over the individual seeking other resources or references to assist them in answering the questions. Utilizing a mailed questionnaire for data collection provided the limitation of having to rely on the response rate of the sample, although the return rate of 49.37% is considered to be a good response for a mailed questionnaire.

Recommendations for Further Research

The PKS was intended to study only the knowledge level of respondents and did not attempt to investigate the attitudes, beliefs and behaviours of participants. A study in which the latter elements were studied in addition to knowledge level would be helpful in ascertaining if any relationship exists between them. A key element in preconceptional health promotion would be to ascertain how to teach and motivate people before they decide to try to get pregnant to utilize preconceptional services, and to make choices to optimize preconceptional health. Research is needed on the cost effectiveness of preconceptional health promotion, and if it does indeed make a difference to the course and outcome of pregnancy.

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APPENDICES

APPENDIX A

Preconceptional Knowledge Survey

Preconceptional Knowledge Survey

The purpose of this survey is to find out more about what people know, before they get married, about 1) hazards to the development of a baby before it is born and 2) what people can do before pregnancy to make sure they have the greatest chance of having a healthy baby.

Your cooperation in answering these questions is appreciated. Your name is not required on the questionnaire. The information you provide will be completely anonymous.

Please complete the questionnaire on your own, without talking to your partner. This is important because I would like to know if men and women answer the questions differently. If you discuss the answers after you are finished filling out the questionnaire please do not change your answers.

Please complete the following information by circling the number of the appropriate response.

				PLEASE DO NOT WRITE IN THIS SPACE
Sex:	1. female	Age:	1. 15-19	
	2. male		2. 20-24	
			3. 25-29	
Education:	1. grade 9 or less		4. 30-34	01___
	2. some high school		5. 35-39	02___
	3. high school graduate		6. 40-44	
	4. some college or technical school		7. 45+	03___
	5. college or technical school graduate			
	6. some university			
	7. university graduate			
	8. university post graduate			
Marriage:	1. will be first marriage			04___
	2. married before			
	3. lived in previous stable relationship			
Religion:	1. Protestant			05___
	2. Catholic			
	3. other Please specify______________			
	4. no religious beliefs			
Children:	1. no children			06___
	2. no children but previous miscarriage			
	3. pregnant			
	4. 1 or more children			
	5. partner has 1 or more children			

Planning a pregnancy: 07___

1. within the next 0-12 months
2. within the next 13 months to two years
3. within the next 25 months to three years
4. no plans but would like children
5. have decided not to have children

Birth control:

Using now:	Plan to use after marriage:	08___
1. condom	1. condom	09___
2. condom and spermicide	2. condom and spermicide	10___
3. diaphragm or cervical cap	3. diaphragm or cervical cap	
4. birth control pill	4. birth control pill	
5. IUD (intrauterine device)	5. IUD	11___
6. other ex. temperature, cervical mucus, or combination of methods 1-6. Please specify:_________	6. other ex. temperature, cervical mucus, combination of methods 1-6. Please specify:___________	12___ 13___
7. none	7. none	

A. Directions: The first 23 items are true or false statements. You have 3 possible choices for each item. Please indicate whether you think the statement is TRUE or FALSE, or whether you are NOT SURE.

Read each item carefully. Put a check in the box☐ before true, false, or not sure. Mark only ONE response for each item.

1. The chance of getting infections has nothing to do with the food one eats. 14___
   ☐ True ☐ False ☐ Not sure

2. There is no proven safe level of alcohol consumption during pregnancy. 15___
   ☐ True ☐ False ☐ Not sure

3. As long as a medication is in the form of an ointment or cream, it is safe to use when trying to conceive a pregnancy. 16___
   ☐ True ☐ False ☐ Not sure

4. When the pregnant woman smokes only her lungs are involved so there is little or no problem for her unborn baby. 17___
   ☐ True ☐ False ☐ Not sure

5. Herpes is a sexually transmitted disease (STD) that can be an annoyance for those infected, but is of no particular concern in pregnancy. 18___
   ☐ True ☐ False ☐ Not sure

6. Small-for-dates babies (that is, babies that are smaller than expected for the length of pregnancy) have more problems following birth than babies who have grown as expected throughout pregnancy. 19___

☐ True ☐ False ☐ Not sure

7. There are now techniques to screen potential parents before pregnancy occurs to see if they carry genes that could cause conditions such as cystic fibrosis or sickle cell anemia in a newborn baby. 20___

☐ True ☐ False ☐ Not sure

8. X-rays are now controlled so that the danger of radiation to the unborn baby is a thing of the past. 21___

☐ True ☐ False ☐ Not sure

9. The time when you begin to try to conceive a baby is a good time to shed those few extra pounds to get down to your 'ideal' weight. 22___

☐ True ☐ False ☐ Not sure

10. Generally, women who smoke have babies who are shorter, and weigh less than babies of women who do not smoke. 23___

☐ True ☐ False ☐ Not sure

11. Taking prescription or over-the-counter drugs only cause problems if taken in the first eight weeks of pregnancy. 24___

☐ True ☐ False ☐ Not sure

12. The placenta or after birth, through which oxygen and other substances are passed from the mother to the unborn baby, blocks all substances which might harm the baby. 25___

☐ True ☐ False ☐ Not sure

13. Pregnant women who don't like the taste of milk can substitute other enriched dairy products and still maintain an adequate diet. 26___

☐ True ☐ False ☐ Not sure

14. Infants of parents who smoke are more likely to develop pneumonia and bronchitis in their first year of life than children of parents who do not smoke. 27___

☐ True ☐ False ☐ Not sure

15. There is more alcohol in 1 oz of hard liquor than in either a bottle (12 oz) of beer or a glass (4 oz) of wine. 28___

☐ True ☐ False ☐ Not sure

16. Since sexually transmitted diseases (STD's) are passed from one person to another by sexual contact, there is no way that a pregnant mother could pass an STD to her baby. 29___

☐ True ☐ False ☐ Not sure

17. It's good practice to limit your use of salt during a normal pregnancy. 30___

☐ True ☐ False ☐ Not sure

18. The food habits of both the mother and the father will affect the development of their child's food habits. 31___

☐ True ☐ False ☐ Not sure

19. Working in certain occupations may be hazardous to the egg or sperm before conception. 32___

☐ True ☐ False ☐ Not sure

20. Stopping smoking, even as late as the end of the fourth month of pregnancy, will improve the health of the child at birth. 33___

☐ True ☐ False ☐ Not sure

21. When a doctor prescribes a medication during a woman's pregnancy, discussion regarding the benefits and the risks of her taking the medication is the responsibility of the pregnant woman. 34___

☐ True ☐ False ☐ Not sure

22. No matter what the pregnant woman eats or drinks, the unborn baby gets the nutrients that are needed. 35___

☐ True ☐ False ☐ Not sure

23. A woman who does not gain enough weight during pregnancy has an increased chance of having a premature or low birth weight baby. 36___

☐ True ☐ False ☐ Not sure

B. DIRECTIONS: Read each question carefully. There is ONE correct answer for each question. Please circle the letter of the statement which you think is the best answer. If you do not know the answer, please circle the letter beside 'don't know'.

24. A family health history (including the health histories of grandparents, parents, sisters, brothers, aunts, uncles, and cousins) should ideally be collected and shared with your doctor 37___

  a. only if a genetic condition is known to be present in the family.
  b. just as soon as a pregnancy is confirmed.
  c. before starting to conceive a baby.
  d. don't know

25. Constipation is often a concern for the pregnant woman. Which of the following is NOT a good way to deal with this problem? 38___
    a. increase amount of whole grain cereal in diet
    b. take a laxative
    c. do more exercise
    d. drink more fluids
    e. don't know

26. When the birth control pill is being used as a method of contraception, and the decision is made to begin to try to conceive a baby, the woman should 39___
    a. stop the pill and begin trying to conceive
    b. stop the pill but use another birth control method for at least three weeks.
    c. stop the pill but use another birth control method for 3-6 months.
    d. don't know

27. Fetal Alcohol Syndrome (a condition affecting the baby) is caused by drinking heavily (at least 5 drinks of alcohol per day) during pregnancy. The problems associated with this condition can be reversed if: 40___
    a. the woman stops drinking during the last month of pregnancy
    b. the doctor gives the baby special attention at birth
    c. the parents provide a stimulating environment for the baby following birth
    d. none of these
    e. don't know

28. The risk of having a child with Down Syndrome 41___
    a. increases as a woman gets older
    b. increases as a man gets older
    c. both a and b
    d. does not change with age
    e. don't know

29. A friend is planning on becoming pregnant and tells you she has not had German measles (rubella). What can you tell her about preventing the possibility of getting this illness? 42___
    a. there is nothing she can do to prevent getting rubella
    b. she should see her doctor to get a blood test
    c. rubella has been eliminated, and is no longer a hazard
    d. don't know

30. Taking vitamins every day 43___
    a. will ensure good nutrition even if a person does not eat properly
    b. could be harmful to a developing baby before birth if taken in excess by the mother.
    c. both a and b
    d. don't know

31. A place that a person works could be suspected to cause a hazard to reproductive health if 44___
    a. the person or their partner has had a miscarriage, stillborn baby, or a baby born with a defect.
    b. a coworker or their partner has had a miscarriage, stillborn baby, or a baby born with a defect.
    c. both a and b above
    d. none of the above

C. DIRECTIONS: Please read each item carefully and follow the directions in each question.

32. Which of the following conditions have been associated with drinking alcohol during pregnancy? Place a check mark in the box☐ beside the response that you choose.

miscarriage	☐ yes	☐ no	☐ not sure	45___
lower than normal birth weight	☐ yes	☐ no	☐ not sure	46___
hyperactivity of infant	☐ yes	☐ no	☐ not sure	47___

33. Canada's Food Guide recommends that people eat a certain number of servings per day from each of the food groups. How many servings of food from each food group does an adult need each day?

FOOD GROUPS	NUMBER OF SERVINGS				
Fruits and Vegetables	☐ 2-3	☐ 4-5	☐ 6-7	☐ don't know	48___
Breads and Cereals	☐ 1-2	☐ 3-5	☐ 6	☐ don't know	49___
Meat and Alternatives	☐ 1	☐ 2	☐ 3	☐ don't know	50___
Milk and Milk Products	☐ 2	☐ 3	☐ 4	☐ don't know	51___

34. How many servings of foods from each food group does a pregnant woman need each day?

FOOD GROUPS	NUMBER OF SERVINGS				
Fruits and Vegetables	☐ 2-3	☐ 4-5	☐ 6-7	☐ don't know	52___
Breads and Cereals	☐ 1-2	☐ 3-5	☐ 6	☐ don't know	53___
Meat and Alternatives	☐ 1	☐ 2	☐ 3	☐ don't know	54___
Milk and Milk Products	☐ 2	☐ 3-4	☐ 5	☐ don't know	55___

35. In some situations it is essential to know if a woman is or could be pregnant. Is this fact true in the following situations? Check☐ your response.

When going to emergency because of a broken wrist ☐ yes ☐ no ☐ not sure 56___

When requesting immunizations ☐ yes ☐ no ☐ not sure 57___

Attending the doctor for treatment of bronchitis ☐ yes ☐ no ☐ not sure 58___

36. A baby may be born with a hereditary condition because: 59___
   a. his parent's ancestors came from the same country
   b. one of his parents carries the gene for the hereditary condition
   c. a change occurred in one of the child's genes
   d. all of the above
   e. none of the above

37. Exposure of a person to chemicals at work or at home may: 60___
   a. damage the egg of a woman
   b. damage a man's sperm
   c. harm the unborn baby
   d. decrease interest in sex
   e. alter menstrual cycles
   f. all of the above
   g. none of the above

Are you sexually active at this time? ☐ yes ☐ no 61___

If not, have you been sexually active in the past? ☐ yes ☐ no 62___

38. People working in the following jobs could be risking damage to their:

	Egg or sperm before conception	Developing baby in pregnancy	
Pottery makers	☐ yes ☐ no ☐ not sure	☐ yes ☐ no ☐ not sure	63___ 64___
	Why or why not?____________ ____________________________ ____________________________	Why or not?______________ ____________________________ ____________________________	
Farmers	☐ yes ☐ no ☐ not sure	☐ yes ☐ no ☐ not sure	65___ 66___
	Why or why not?____________ ____________________________ ____________________________	Why or why not?____________ ____________________________ ____________________________	
Painters	☐ yes ☐ no ☐ not sure	☐ yes ☐ no ☐ not sure	67___ 68___
	Why or why not?____________ ____________________________ ____________________________	Why or why not?___________ ____________________________ ____________________________	
Operating room staff	☐ yes ☐ no ☐ not sure	☐ yes ☐ no ☐ not sure	69___ 70___
	Why or why not?____________ ____________________________ ____________________________	Why or why not?___________ ____________________________ ____________________________	
X-ray technicians	☐ yes ☐ no ☐ not sure	☐ yes ☐ no ☐ not sure	71___ 72___
	Why or why not?____________ ____________________________ ____________________________	Why or why not?____________ ____________________________ ____________________________	
House cleaners	☐ yes ☐ no ☐ not sure	☐ yes ☐ no ☐ not sure	73___ 74___
	Why or why not?____________ ____________________________ ____________________________	Why or why not?____________ ____________________________ ____________________________	

This is the end of the questionnaire.

Were you able to answer all of the questions? ☐ yes ☐ no 75___

If no, was it because you: 76___

a. did not have enough time
b. are not familiar with English
c. found questions too hard
d. questions were not clear
e. other____

Did you complete the questionnaire: 77___

a. alone
b. together with your partner
c. other (please specify)____

It is not requiredthat you put your name on the questionnaire, but if you would like a copy of the questionnaire, along with correct answers to the questions, and a summary of the research findings, please write your name and address below.

Your name will not be used in association with the answers that you provide. Names will be separated from the questionnaires before the answers are recorded. Lists of names will be destroyed once the information has been sent to you.

NAME:____
ADDRESS:____
CITY:____
POSTAL CODE:____

Thankyou for doing this!

APPENDIX B

LETTER OF INTRODUCTION TO THE STUDY

Letter of Introduction to a Research Study

Elaine Pedersen, RN, BScN
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Dear Premarriage class registrant;

I am a nurse taking my master's degree in nursing at the University of Alberta. I am conducting a research study to find out more about what people taking premarriage classes know about

1) hazards to the development of babies before they are born
2) what men and women can do long before pregnancy to increase their chances of having a healthy baby.

The information from this study will help nurses and other professionals to better understand the information needs of men and women before they decide to get pregnant. Professionals would therefore be able to plan appropriate ways to provide pertinent information to people who want to know how they can plan for a healthy baby before pregnancy begins.

People enroled in premarriage classes during the spring of 1991 will be mailed a questionnaire. This questionnaire will include 38 questions, and should take about 30 minutes to complete. You will be provided with a postage paid, self addressed envelope within which to return the questionnaire to the investigator. Names will not be required on the questionnaires, and your **answers will be completely anonymous**. If you would like a **copy of the answers** to the questionnaire, you may provide your name and address and I will mail you a copy of the questionnaire, answers, and a summary of the study results. Your name and address will be removed from the questionnaire and will not be associated with the answers that you give. By returning the questionnaire it is assumed that you have consented to participate in the study.

In order to be able to gain meaning from the results of this study, it is very important that as many individuals as possible complete and return the questionnaire.

A summary of the results of the study will be available at the agency where you took your premarriage classes about six months from now. The information collected will be used for research or educational purposes in nursing and other professions concerned with promoting health.

Sincerely

Elaine Pedersen, RN, BScN

APPENDIX C

COVERING LETTER TO SAMPLE GROUP

APPENDIX C
Covering Letter to Sample Group

Elaine Pedersen
Master's of Nursing Candidate
Faculty of Nursing, University of Alberta
Edmonton, T6G 2J9
Phone: 437-0250

Dr. Peggy Anne Field
Thesis Supervisor
Faculty of Nursing, U of A
Edmonton, T6G 2J9
Phone: 492-6248

Dear ________________________;

You are among the premarriage class registrants who have been selected to participate in the research study that was first described to you in the letter included in your premarital class registration package.

The purpose of the study is to examine the knowledge of men and women taking premarriage classes about 1) hazards to the development of babies before they are born and 2) what people can do before they ever decide to try to have a baby to influence the health of any future babies.

Having a better understanding about the knowledge level of people before they get married, and before they become parents will help nurses and other professionals to better understand the information needs of people before they decide to get pregnant. This will mean that nurses and other health professionals will be better able to plan for ways to provide information to individuals who want to know how they can plan for a healthy baby, before they decide to get pregnant.

The only requirement for participation in this study is that you **complete the attached questionnaire**. It should take you about 30 minutes to complete. Names are not required on the questionnaire, but **if you provide your name and address, the questionnaire, correct answers, and a summary of the study results will be mailed to you**. Your names and addresses will be removed from the questionnaires and will not be associated with the answers that you provide. Questionnaires are to be completed and returned to the investigator by ___________(two weeks following mailing). Participants will be telephoned or sent a letter ten days after the questionnaires have been mailed out to ensure that the questionnaire was received, and to provide an opportunity for you to ask any questions about completing the questionnaire.

Upon completion of the study the investigator will provide the agency where you enroled in premarriage classes with a summary of the information obtained in the study. This will take place in approximately six months time. The information collected will be used for research or educational purposes in nursing and other health professions.

In order for the information in this study to be meaningful, it is extremely important that as many questionnaires as possible be returned.

Thankyou very much for your participation in this important research.

Sincerely

Elaine Pedersen, RN, BScN

APPENDIX D

PREMARRIAGE CLASS ANNOUNCEMENT

APPENDIX D

Class Announcement

You are among the premarriage class registrants who have been selected to participate in the research study that was first described to you in the letter included in your premarital class registration package. The study is being conducted by a nurse who is enroled in the masters of nursing program at the University of Alberta.

The purpose of the study is to examine the knowledge of men and women taking premarriage classes about 1) hazards to the development of babies before they are born and 2) what people can do before they ever decide to try to have a baby to influence the health of any future babies.

Having a better understanding about the knowledge level of people before they get married, and before they become parents will help nurses and other professionals to better understand the information needs of people before they decide to get pregnant. This will mean that nurses and other health professionals will be better able to plan for ways to provide information to individuals who want to know how they can plan for a healthy baby, before they decide to get pregnant.

The only requirement for participation in the study is that you complete a questionnaire that would be mailed to your home, and which you would then mail back to the researcher in a postage paid envelope provided for that purpose. Answers on the questionnaire are completely anonymous. Your involvement in the study is in no way related to your involvement in the premarriage course.

Please write your name, address and phone number on the sheet of paper that will be circulated during the class so that the researcher may contact you.

Thankyou for your anticipated involvement in this important research!

For further information please contact Elaine Pedersen, RN, BScN, 437-0250.

Please send me a questionnaire so that I may participate in the

PRECONCEPTIONAL KNOWLEDGE SURVEY:

NAME	ADDRESS	PHONE NUMBER

APPENDIX E

PKS ITEMS IN SUBJECT AREAS

APPENDIX E

PKS ITEMS WITHIN SUBJECT AREAS

SUBJECT I: NUTRITION Total Possible Score = 17

PKS Section A : Items l,9,13,17,18,22,23

PKS Section B : Items 26,30,

PKS Section C : Items 33,34

SUBJECT 2: HAZARDS TO REPRODUCTIVE HEALTH Total Possible Score= 25

PKS Section A : Items 2,3,4,5,8,10,11,12,14,15,16,20,21

PKS Section B : Items 25,26,27,29

PKS Section C : Items 32(1,2,3), 35(1,2,3)
38 (Xray pregnancy, xray preconception)

SUBJECT 3: OCCUPATIONAL FACTORS IN REPRODUCTIVE HEALTH Total Possible Score=15

PKS Section A : Items 19

PKS Section B : Items 31

PKS Section C : Items 37,
38(Pottery preconception & pregnancy)
38(Farm preconception & Pregnancy)
38(Paint preconception & pregnancy)
38(Operating room preconception & pregnancy)
38(Xray preconception & pregnancy)
38(House cleaning preconception & pregnancy)

SUBJECT 4: PRECONCEPTION Total possible score = 22

PKS Section A : Items 3,7,9,19

PKS Section B : Items 24,26,28,29,30,31

PKS Section C : Items 33(1,2,3,4),36,37
38(Pottery preconception)
38(Farm preconception)
38(Paint preconception)
38(Operating Room preconception)
38(Xray Preconception)
38(House Cleaning Preconception)

APPENDIX F

ANSWER KEY FOR PRECONCEPTIONAL KNOWLEDGE SURVEY

APPENDIX F

ANSWER KEY FOR PRECONCEPTIONAL KNOWLEDGE SURVEY

SECTION A:

1. FALSE
2. TRUE
3. FALSE
4. FALSE
5. FALSE
6. TRUE
7. TRUE
8. FALSE
9. FALSE
10. TRUE
11. FALSE
12. FALSE
13. TRUE
14. TRUE
15. FALSE
16. FALSE
17. FALSE
18. TRUE
19. TRUE
20. TRUE
21. TRUE
22. FALSE
23. TRUE

SECTION B:

24. c
25. b
26. c
27. d
28. c
29. b
30. b
31. c
32. yes
    yes
    yes
33. 4-5
    3-5
    2
    2
34. 4-5
    3-5
    2
    3-4
35. yes
    yes
    yes
36. d
37. f
38. Pottery makers yes yes
    Farmers yes yes
    Painters yes yes
    Operating Room Staff yes yes
    X-ray technicians yes yes
    House cleaners yes yes